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# blue jay

December, 1977



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Great Horned Owl

Hans Dommasch



# LAND USE PLANNING IN CYPRESS HILLS PROVINCIAL PARK, SASKATCHEWAN

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Planning for land use in Cypress Hills Provincial Park is representative of the problems faced in resolving land use conflicts in provincial parks throughout Saskatchewan. Cypress Hills Provincial Park, which encompasses 44 square kilometers (17 sq. mi.) of the Centre Block and 135 square kilometers (53 sq. mi.) of the West Block of the Cypress Hills, provides recreational opportunities which are otherwise unavailable in southwestern Saskatchewan. Opportunities and facilities include campgrounds, cottages, institutional camps, golfing, swimming, fishing, hiking and horseback trail riding. Winter activities include downhill skiing, snowmobiling and cross-country skiing. Hunting of moose, elk, deer and game birds is licensed in the Park.

As in most provincial parks and recreation areas throughout Saskatchewan, the number of visitors to Cypress Hills Provincial Park is increasing annually. In 1976, an estimated 241,000 people visited the Park. This represented an increase of 7 percent since 1972. The number of visitors to Fort Walsh National Historic Site, which is adjacent to the Park boundary, was estimated at 29,930 in 1976, an increase of 34 percent since 1972. Accompanying this increase in visitors is an increased demand for visitor accommodation, services and recreational facilities.

Potential developments in the region would likely result in an increase in visitors to the Saskatchewan and Alberta Cypress Hills Parks. The proposed National Grasslands Park is about 180 km southeast of Cypress Hills Provincial Park. An alternate tourist route south of the TransCanada Highway has been proposed which could link the Alberta and Saskatchewan Parks, the

proposed National Park and points to the east. Access to this route could be provided at various points on the TransCanada Highway including roads adjacent to the Centre and West Blocks. These developments would also increase the demand for recreational opportunities and facilities in the Provincial Parks.

In addition to these recreational interests, there are other demands for land use in the Park. Local residents wish to continue traditional land uses such as livestock grazing, mowing and lumbering. Land adjacent to the Park is primarily crown land leased by ranchers for grazing livestock. Since the private land holdings of these ranchers are relatively small, the Park is considered important for grazing. The demand for hay depends upon annual fluctuations in the amount of precipitation. In drier years, hay from the plateau is in greater demand. Cutting of white spruce and lodgepole pine occurs primarily in the West Block.

The Cypress Hills are also of interest to scientific and education groups for interpretation of natural processes and historical events. The University of Regina has leased 2.6 square kilometers (1 sq. mi.) of land in the West Block to serve as a field station for classes and research projects. The Saskatchewan International Biological — Conservation Terrestrial Committee identified two areas in the West Block as potential ecological reserves.

Mineral interests in the Park include gravel extraction and oil and gas leases. The Saskatchewan Oil and Gas Corporation has leased 13 square kilometers (5 sq. mi.) of land in the West Block for petroleum and natural gas exploration. These ten year leases were obtained in 1974.





Valley of Lonepine Creek, looking south

Elizabeth McGregor

Coal was extracted from the Hills for local use during the early 1900's. Currently, there is no expressed interest in the coal deposits. Geological Survey of Canada conducted a series of tests in the Hills in 1976. The purpose was to test methods for prospecting for buried uranium deposits. Uranium rich coal seams and radioactive fossil bones have led to speculation about the existence of uranium deposits in the Cypress Hills.

Water resources support wildlife and domestic livestock. Water is stored in Adams Lake and released for downstream irrigation projects. Stocked streams and lakes provide recreational fishing.

The Park cannot provide maximum resource use to satisfy all of these interests. A plan for future use of the Park is essential. Several questions are critical in planning for land use in the Cypress Hills. What is the purpose of the Park? What are the potential

effects of an increase in recreational activity in the Park? Can the Park support resource uses such as grazing, lumbering and haying in addition to recreational activities? What are the potential effects of continued grazing, lumbering, haying and hunting?

In this article, I will review the recent planning activities for land use in the Park, delineate the significant features of the Park, and examine the implications of some of the recent recommendations for Park use.

### **Administration**

The Cypress Hills have long been valued for their resources. For 70 years, parts of the Cypress Hills have received protection. Due to concern about diminishing resources, the first Federal Forest Reserves were designated in 1906. By 1916, 45 square kilometers (177 sq. mi.) of the Saskatchewan and Alberta Cypress Hills were reserved under The Dominion Forest Reserves and Parks Act. In





Battle Creek Valley

Elizabeth McGregor

In 1931, the forest reserves were transferred to provincial jurisdictions and the Centre Block was designated as the Cypress Hills Provincial Park by order-in-council. The Saskatchewan West Block and East Block remained as Provincial Forest under the provisions of The Forest Act. In 1956, the East Block was transferred to Department of Agriculture jurisdiction. The West Block was added to the Saskatchewan Cypress Hills Provincial Park by order-in-council in 1976. A detailed account of land transfers, legislation, policy, land use and management since the inception of the reserves is presented by Scace.<sup>1</sup>

Responsibility for land use management in the Cypress Hills Provincial Park is divided between a number of different agencies. The Department of Tourism and Renewable Resources (DTRR) is charged with administration of The Provincial Parks, Protected Areas, Recreation Sites and Antiquities Act. The Tourism and

Recreation Planning Branch (DTRR) is primarily responsible for providing policy and planning for land use in parks. The Regional Services Branch (DTRR) provides facilities, services and general administrative framework for parks and together with the Museums Branch (Department of Culture and Youth) provides natural history research and interpretive services.

In the Cypress Hills Provincial Park, the Saskatchewan Fisheries and Wildlife Branch (DTRR) and Canadian Wildlife Service determine hunting limits for big game, waterfowl and game birds. The Forestry Branch (DTRR) manages forest and pasture resources. The Department of Northern Saskatchewan administers fire control. Environment Canada, the Saskatchewan Department of the Environment and Prairie Farm Rehabilitation Administration monitor stream flow and water quality and regulate stream flow. Mineral



leases are administered by the department of Mineral Resources.

The management of various land uses by a number of agencies can result in management actions which conflict with one another and with the objectives of park use. Although there are channels of communication between agencies, programs for managing forest, grassland, wildlife and recreation are often carried on independently of one another. Coordination of these programs often depends upon regional and park administrators. To ensure that park land use is consistent with the purposes for which parks are designated, a coordinated planning and management program must be developed.

## Planning

The most recent planning for land use in Cypress Hills Provincial Park includes a master plan and a master plan study. In 1969, a master plan was prepared for Cypress Hills Provincial Park and Provincial Forest.<sup>2</sup> The plan recommended that the Centre Block be managed as a recreation area and the West Block as a natural area. Although the plan was never approved, it did result in upgrading recreational facilities by provision of a visitor centre, additional campgrounds, and staff and public accommodation in the Centre Block.

In the 1970's there was continued recognition of the need for management plans for the Park and Forest. As the Tourism and Recreation Planning Branch did not have sufficient time or staff to prepare a master plan, a consultant was contracted to undertake a master plan study for the Cypress Hills Provincial Park and Forest.

Although the master plan study did not provide adequate information to enable development of management policies for the Park, it did provide a basis for public discussion of future land use in the Park.<sup>3</sup> A summary of the master plan study prepared by the Tourism and Recreation Planning Branch was distributed to the public in the spring of 1976. Information meetings and public hearings to dis-

cuss the proposed plan were held in Swift Current, Maple Creek and Cypress Hills Provincial Park in June, 1976. These meetings were conducted by a Panel and Task Force. Panel members represented the Departments of Tourism and Renewable Resources, Municipal Affairs and the Environment. The Task Force included the Park Superintendent and personnel from the Forestry Branch, Fisheries and Wildlife Branch, and Tourism and Recreation Planning Branch.

Following the public hearing, the Panel and Task Force members evaluated information provided by the public hearings, the comment sheets, and the master plan study in order to prepare guidelines for management of the Park. Following approval of these guidelines, a master plan for the Park is to be prepared.

Recommendations of the Panel and Task Force on the Cypress Hills Provincial Park public hearings were presented and discussed at a public meeting held in the Park in August, 1977.<sup>4</sup> These recommendations have been submitted to DTRR for consideration and action. No planning process for preparation of a master plan for the Park has yet been approved.

Coincidentally, the Alberta government is currently preparing a master plan for the Alberta Cypress Hills Provincial Park. The planning program is somewhat similar to the process undertaken in Saskatchewan, and the responsible agency is currently preparing policy recommendations which will provide a basis for preparing a park master plan. The Saskatchewan and Alberta governments are each planning for future management in the respective Cypress Hills Parks. Recent attempts to cooperate in planning include discussion about access and circulation and ungulate management. Because the Cypress Hills are a physical unit with similar environmental and cultural features throughout, further discussion is required to examine the potential influences of plans for land use in the adjacent Parks.

A master plan is a control document which should serve as a long range policy guide for management of park resources and programs. The master plan is the result of a planning process which can be divided into four phases. First, an inventory and evaluation of park resources and values is essential to planning for management. Secondly, regional, political and economic constraints affecting the park require analysis. This inventory and analysis enables formulation of the purposes and objectives of the park and how it will be used by people.<sup>5</sup> Guidelines for applying these purposes and objectives to the park can then be developed.

Although there has been no detailed inventory of the Park resources, the Cypress Hills have been the subject of numerous botanical, wildlife and geological studies which have identified some of the significant features of the Park.

### Significant Features

The Cypress Hills support a diversity of vegetation not found elsewhere in southwestern Saskatchewan. Lodgepole pine, white spruce and aspen forests grow on the north facing slopes. The more gentle, south facing slopes and the plateau support mixed grass prairie and fescue prairie. Forests and wetland complexes grow along stream valleys and gulleys. The Cypress Hills thus provide an opportunity to observe plant communities representative of grassland, aspen parkland, cordilleran and boreal communities normally found over greater latitudes.

A number of plant species are found in the Cypress Hills which are not found elsewhere in Saskatchewan. Plant species which are more typical of the foothills and Rocky Mountains are today found in the Hills. Of the 669 vascular plant species reported in the Cypress Hills, 6 percent are cordilleran species.<sup>6</sup> Similarly, 8.3 percent of the mosses are representative of montane species.<sup>7</sup> Lodgepole pine is found in Saskatchewan only in the Cypress

Hills. The presence of 14 species and two varieties of orchids in such a small area is also of botanical interest.<sup>8</sup>

The presence of fescue grassland is of botanical and scientific interest because much of the fescue grassland in Saskatchewan and Alberta has been cultivated.<sup>9</sup> Cypress Hills Provincial Park is the only provincial park containing a representative fescue grassland. The fescue grassland, which provides food for elk and deer and cover for small mammals and birds, is also valued for livestock grazing.

Wetland and shrub communities along streams are limited by comparison with acreage of other plant communities in the Hills. These communities provide critical habitat for wild ungulates and trumpeter swans.

The forested slopes of the Hills enhance the scenic quality of the region and provide habitat for animal species not found elsewhere in southwestern Saskatchewan. These forest stands are also a source of lumber and poles for use in the immediate region.

A habitat inventory of southwestern Saskatchewan by the Saskatchewan Wildlife Division identified the Cypress Hills as critical habitat for moose, elk, mule deer and white-tailed deer and trumpeter swans. This habitat does not include all of the range used by these animals but it is necessary for maintaining the present populations.

Fisheries and Wildlife surveys in the spring of 1977 indicated a conservative estimate of 80-100 moose and 600-700 elk in the Saskatchewan-Alberta West Block. Estimates of deer population are more difficult to obtain because of the highly varied topography. The Centre Block supports smaller ungulate populations.

Trumpeter swans, at one time considered an endangered species, nest in the Cypress Hills and one other area in Saskatchewan.<sup>10</sup> The Park provides feeding habitat for double-crested cormorants and white pelicans which may nest in Cypress Lake south of the Park. The Cypress





Eroded shoreline of Adams Lake

Elizabeth McGregor

Hills are critical habitat for turkey vultures. MacGillivray's warbler, Oregon junco and Audubon's warbler, which nest in the Park, normally inhabit the mountains. The value of the birds present in the Cypress Hills is not only in those species which may be rare in other parts of the province and surrounding grassland. Equally important is the opportunity to observe birds of many habitats.

The sagebrush pocket gopher, badlands meadow vole and pallid sagebrush vole which are present in the Hills are of interest because they usually inhabit the more arid Missouri watershed. Mammals present in the Cypress Hills which are more likely to be found in aspen parkland, boreal or cordilleran habitats include the American varying hare, striped ground squirrel, little northern chipmunk, Richardson pocket gopher, gray bushy-tailed wood rat, plains red-backed vole, little Rocky Mountain weasel and the Hudson Bay mink.<sup>11</sup> The status of the northern plains red fox, an inhabitant of aspen

parkland, is uncertain in the Hills. The pallid-barred bobcat is an occasional wanderer through the Hills.

Geological formations present in the Hills are not found elsewhere in Saskatchewan; some are unique in Canada. These formations remained after glaciation.

The cultural heritage of the Hills is also a significant feature of the Park. Accounts of the pre-European landscape in the Cypress Hills indicate a rich and varied wildlife resource. The isolated Hills served as a buffer zone between the Saskatchewan and Missouri watersheds until fur trading advanced to the Hills in the 1870's. When resources became scarce on the surrounding plains, large numbers of Indians and Metis were attracted to the Hills by the relative abundance of wildlife. Many animal species became extinct in the Hills as a result of hunting, trapping and predator control programs.<sup>1 12</sup> The history of fur trading activities, early settlement and the North West Mounted Police in the Hills is presented at Fort Walsh





Inside the fenceline, Northwest corner of West Block

Elizabeth McGregor

National Historic Site.

These many features of the Cypress Hills are of interest to recreational users, conservationists, scientists and local residents. The unique features of the Cypress Hills must be considered in determining purposes and objectives for use of the Park.

### **Objectives for Management**

At the present time, no specific policy guidelines for management of the Park have been approved. Therefore, the following general objectives are assumed in order to provide direction for planning for management of the Park. These objectives result from my review of legislation, proposed park policy, viewpoints expressed at public hearings, other public interests, and discussion with agencies responsible for management of the Park.

1. To identify, protect and preserve significant biological geological and historic features of the Park.

2. To promote recreational activities which will enable the visitor to understand and appreciate the biological features and processes and the historic resources of the Park, and which will be compatible with protection of the significant features of the Park.
3. To provide opportunities for educational and scientific study and interpretation which will be compatible with protection of significant features of the Park.
4. To determine a use level which will ensure a high quality outdoor experience.
5. To allow resource use which will be compatible with the protection of significant features of the Park.

To achieve these objectives, coordinated management plans which will be consistent with the protection of the significant features of the Park must be prepared. To be effective, management plans must be flexible and open to change as new information about park resources becomes available.



These general objectives serve as a basis for examination of some of the recommendations of the Cypress Hills Provincial public hearings.

## **Vegetation Management**

The Panel and Task Force recommended that livestock grazing and haying continue according to approved management plans and that mowing should be used to control shrubby cinquefoil.<sup>4</sup> What, then, are the current grazing and mowing practices? What are the implications of these practices?

The number of livestock grazed in the West Block is based upon a detailed range management plan prepared in 1954.<sup>13</sup> This plan recommended the number of livestock to be grazed and management practices for salting, herding, fencing, season of use, and a mowing program to control shrubby cinquefoil. In 1953, 2,358 animal units were grazed in the West Block for 5 months. It was recommended that 1,973 animal units be grazed over a 4 month season. (An animal unit is a mature beef cow with or without a calf.)

By 1967, 13 years after the recommended animal unit reduction, 2,400 animal units were still being grazed over a 5 month season. The carrying capacity of the range was adjusted in 1967 to allow for 2 sections of grassland which had been deleted from the West Block and increased the assignment of grazing to brush and aspen acreage. It was recommended that the number of animal units grazed be reduced from 2,400 to 1,900 over a 3 to 5 year period.

Currently, 1900+ animal units are grazed in the West Block and 300+ animal units in the Centre Block for 5 months. This assignment is based upon recommendations made in 1954 and 1967. The numbers of animal units assigned to the grassland communities is that recommended for a fescue prairie. This does not allow for the lower productivity of mixed grass communities on lower slopes, benchland and valley bottoms.

The assignment of animal units in the Cypress Hills assumed that only livestock would be grazed. Brush and aspen stands were included in the range assignment. No allowance was made for the elk, moose, mule deer, and white-tailed deer which inhabit the Hills. No allowance is made for variation in the amount of precipitation from year to year.

Overgrazing can occur if livestock and ungulate numbers are too great to be supported by available forage. Overgrazing of palatable species reduces plant vigour which enables other less palatable species to encroach. Thus a change in species composition can occur. A sampling study in the fescue grassland of the Park in September, 1976, revealed differences in species composition between areas under different management practices.<sup>14</sup> The percentage coverage by fescue in grazed and mowed sites ranged from 7 to 39 percent. In a site which has not been grazed or mowed in recent years, fescue had a mean coverage of 50 percent. June grass and wild oat grass, which increase under grazing in fescue grassland, had a greater mean coverage in the mowed and grazed sites than in the unmowed, ungrazed site. Other species which increased in grazed and/or mowed areas were shrubby cinquefoil, fleabanes, northern gentian, silvery lupine, and prairie selaginella.

Physical damage to shrubs and tree seedlings by livestock also results in decreased productivity. Concentrated use can remove vegetation thus subjecting the soil to wind and water erosion. Frequently used paths can be eroded and form pathways for water runoff which results in gullyng. Cattle shelter in tree stands. Thus some aspen groves and spruce stands in the Park have been denuded of understory vegetation by the congregation of cattle. Heavy use of the forage means that less plant fibre is returned to the soil which can in turn result in changes in soil characteristics and reduced productivity.

During the 1950's, recommendations were made to implement a





Sawmill operation along Mink Creek, West Block

Elizabeth McGregor

mowing program in the West Block to control shrubby cinquefoil. Although mowing was never implemented according to recommendations, mowing of hay has continued. The abundance of shrubby cinquefoil in the West Block appears to have been controlled by mowing.

An area may be mowed every 3 to 5 years depending upon demand for hay. Although the mowing schedule by itself is not likely to cause changes in species composition, mowed areas are also subject to grazing throughout the season. Mowing reduces the amount of litter which remains which in turn can cause a drier microclimate and a lower return of nutrients to the soil. Mowing in the Centre Block is restricted to areas used for recreational activities.

Three alternatives can be considered for management of the grasslands. Livestock grazing could be discontinued in the Park. Grazing could be continued at the current levels. Grazing levels could be reduced by reducing the number of animal units grazed or the length of the season or both.

The grasslands of the Park could likely support light to moderate graz-

ing. However, continuing grazing and mowing at the present rates will not ensure protection and maintenance of the significant features of the vegetation communities. Assignment of livestock grazing must provide for the wild ungulates in the Park. Consideration should be given to reducing assignment of grazing to aspen and brush acreage which provide food and shelter for ungulates. It is imperative that range management plans be updated and that effects of grazing and mowing be investigated.

The Panel and Task Force recommended that logging be allowed according to approved management plans.<sup>4</sup> The current timber cutting program in the Cypress Hills is based upon a management plan prepared in 1952 and updated in 1957.<sup>15</sup> The mean annual harvest in the Hills over 17 years has been 75,000 board feet of white spruce and 11,000 board feet of lodgepole pine. At the present time, one sawmill operates in the West Block. Recently, there has been little cutting in the Centre Block. The Forestry Branch carried out an inventory of the Park in 1977 and a forest management plan is to be prepared in 1978.

The forests of the Hills are im-





Elizabeth McGregor

Overgrazed parkland in relation to private ranchland across the fence

mature at the present time. Estimates are that some stands will be mature in 20 to 70 years. If stands mature without major disturbances, there could be a decreased diversity of vegetation. Mature stands have sparse understory and provide little food for ungulates. In the absence of fire, timber cutting is a means to rejuvenate forests although patterns and structure of regenerating forest following lumbering would likely differ from those which would reestablish following fire.

The Cypress Hills do not have a high capability for forest production. However, forest harvesting has not been excessive in recent years. Future forest management plans should continue to be consistent with the objectives of maintaining vegetation diversity, conserving water, controlling erosion, providing food and shelter for wildlife and recreational opportunities for viewing a diversity of communities.

Present policy excludes the use of fire as a management tool. Controlled burning could be considered as a means of regenerating forest stands in the Park. Improved forecasting of burning conditions and probable effects and techniques for burning

might allow fire to be used in the future.

### Wildlife Management

One recommendation of the Panel and Task Force was that hunting be allowed according to approved management plans.<sup>4</sup>

Results of aerial surveys from 1974 to 1977 indicate an increase in the elk population and a decrease in the moose population. An accurate count of ungulates is difficult to obtain because of the topographic variation and because surveys of the Alberta and Saskatchewan West Block have not been coordinated in the past. In 1977-78, Alberta and Saskatchewan will coordinate ungulate surveys which will enable a better estimate of ungulate populations. This is a commendable step towards management of the Cypress Hills as an ecological unit.

Ungulates have few natural predators in the Hills. Records of the increase in the number of elk indicate that the populations can support recreational hunting which is one means to control population increases. The varied terrain and accessibility provide an opportunity for a high quality hunting experience.





Herd of Bull Elk

Ian McMurchy

Conflicts may arise if there is an extension of other recreational activities into the hunting season as safety of recreational users would be a concern.

Although hunting can be used to control ungulate populations, other features of ungulate management must be considered. Browse studies between 1972 and 1977 have indicated a decline in the available browse in recent years. The extent of competition for food between wild ungulates and livestock is not known.

Studies should be undertaken to determine the number of ungulates present in the Cypress Hills and the seasonal use of available range by each species. These studies, together with a study of effects of livestock grazing on vegetation communities, would enable determination of the number of ungulates and livestock which can be supported in the Park. Browse could be improved by reducing the number of livestock grazed, controlling the size of ungulate populations and by cutting decadent browse stands to encourage new growth.

Vehicles can now reach most areas of the Park by roads and fireguards. Continual arousal of ungulates can

cause stress and cause the animals to move to less suitable habitats or restrict animals to smaller ranges. An objective of management of the Park should be to continue to provide habitat for wild ungulate populations. Planning for recreational use and other uses in the Park must consider the potential influences upon ungulate behavior and habitat.

Although no recommendation was made regarding management of trumpeter swans,<sup>4</sup> an active program should be implemented to protect this species. Planning for recreational use in the Park should provide maximum protection of trumpeter swan habitat. Recreational hiking should be directed away from these areas by careful planning of trails. The possibility of improving potential trumpeter swan nesting and rearing habitat in the Park should be investigated.

Likely because of public interest in hunting, wildlife management in the Hills has concentrated on wild ungulates. A comprehensive wildlife management plan to include other mammals and birds should be prepared. Identification of objectives and research requirements would provide direction for each year's



management activities and assist in coordination of studies by other agencies involved in preparation of management plans.

### **Recreation Management**

Several recommendations of the Panel and Task Force are directed towards control of vehicular access and circulation in the Cypress Hills. It was recommended that major travel routes in the Hills be located outside of the Park and that a southern access to Fort Walsh be developed.<sup>4</sup> Implementing these recommendations would certainly assist in protecting the valued features of the Park.

To reduce the pressure of visitor use it was recommended that campgrounds should not be expanded to meet peak demands on the Park, that a "Sorry-Full" approach be tried and that additional campgrounds which may be required be located outside the Park.<sup>4</sup>

Adopting these recommendations would regulate pressure on the Park. However, planning for recreational use in the Park cannot be isolated from recreational activities in other parts of the Hills. A recommendation to develop Cypress Lake for overflow camping requires careful planning because Heglund Island in Cypress Lake is a critical habitat for many colonial bird species in southwestern Saskatchewan.

A recreation management plan should be prepared to prevent haphazard development of services and facilities in the Park. Effort should also be made to coordinate recreational opportunities in the Saskatchewan and Alberta Parks and Fort Walsh.

### **Conclusions**

The policy for land use in Cypress Hills Provincial Park has been oriented towards multiple use. Resource uses in the Park currently include grazing, haying, lumbering, gravel extraction, water storage for irrigation and livestock watering, and recreational activities such as hunting,

recreational driving, fishing, golfing, swimming, hiking, cottaging, and camping. The Park cannot provide maximum resource use to all interest groups. Continuation of the current management practices will result in conflicts between resource users. Therefore, a policy must be formulated to provide for land use in the Cypress Hills.

Concerns expressed at the public hearings and by managers and administrators of the Park strongly support preparation of a master plan for the Park. The primary management objectives should be to protect significant features of the vegetation, wildlife and physical features and to provide recreational opportunities to interpret and study these features. Levels of recreational use and other resource uses such as grazing, lumbering, haying and water storage should be compatible with maintaining the significant features.

Preparation of policy and a master plan for Cypress Hills Provincial Park is the responsibility of the Tourism and Recreation Planning Branch. A planner or planning team is dependent upon an adequate resource inventory and other agencies for specific resource management plans. Planning for land use in the Cypress Hills is also restricted by staff responsibilities for other provincial parks and recreation areas in Saskatchewan. In spite of these difficulties, a means must be determined to prepare and implement a master plan for the Cypress Hills Provincial Park. The recommendations of the public hearings do provide direction for preparation of a master plan. Many of these recommendations can serve as short term management policies. However, short and long term studies of resources and the effects of management practices are required. The Department of Tourism and Renewable Resources should be strongly encouraged to undertake preparation of a master plan for Cypress Hills Provincial Park.





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Eroded trail across the park

Elizabeth McGregor



# ENVIRONMENTALLY DISRUPTIVE ROAD CONSTRUCTION IN THE QU'APPELLE VALLEY

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In southern Saskatchewan, the Qu'Appelle Valley is one of the few tracts of land of which a significant portion remains in a natural condition. Despite the breaking of the rich flood plains, pollution of the water, overgrazing by livestock, the scarring of the slopes through gravel extraction and road building, and uncontrolled cottage development along the lakeshores, the scenic and environmental quality of the valley remains high in many places. Some locations support plant communities which have not been greatly modified by man's influence and wildlife abounds in the undisturbed marshes and woodlands. We hope that wildlife lands, representative biological communities, and areas supporting unique or endangered species will be set aside for the future.

The long term planning objectives of the Qu'Appelle Framework Plan generated a feeling of cautious optimism among many of those people concerned with preserving the natural environment of the valley. Some of the goals of this plan were to preserve, manage, and develop natural areas and fish and wildlife lands; to protect the aesthetic qualities of the valley; and to restore and avoid further disruption to indigenous ecosystems.

Unfortunately, little has been done to achieve these aims and, in fact, recent road construction within the Qu'Appelle simply ignores these objectives. To my knowledge, at least three recent projects of the provincial Department of Highways have considerably damaged the environment of the valley. A fourth project also poses a serious threat. The failure to consider potential environmental impact in the construction of valley roads has caused the scarring of

hillsides and a reduction in the scenic qualities of the valley, the erosion of bare slopes and ditches, and subsequent water pollution by sediments carried from these areas by runoff, the creation of habitat for noxious weeds which invade agricultural, residential, and natural areas, and the destruction of natural ecosystems and important fish and wildlife habitats. Furthermore, some of the roads have questionable social or economic value. A brief description of the projects is given below.

## **Highways 10 and 35 near Fort Qu'Appelle**

To improve travel along Highways 10 and 35, these roads have been rerouted out of the valley near Fort Qu'Appelle. The hillsides cut during construction have eroded badly and much sediment has been deposited in the Qu'Appelle River and Mission Lake. In one place, a stretch of railroad ditch about 200 feet long and 4 feet wide has been filled with 2 to 3 feet of hillside clay. An additional 1 to 2 feet of sediment has been deposited over an approximately 200 square foot area where this ditch empties into the lake. An untold amount of sediment was carried further into the lake. The #35 highway bridge is another site where considerable sediment pollution is taking place.

Excess sediment damages aquatic ecosystems by reducing light penetration to green plants, using up oxygen in decomposition, reducing survival of fish eggs, decreasing the overall water quality, and doing physiological harm to the aquatic organisms.<sup>2 3 7</sup> Sediments also contain nutrients which can stimulate excessive growth of algae and aquatic weeds.<sup>9</sup> It is likely that the present disturbance is detrimental to the already strained





Construction of #6 Highway across the Qu'Appelle Valley

Gary W. Seib

aquatic ecosystems of the Qu'Appelle for these reasons.

Until recently, no effort had been made to revegetate the barren hillsides and only stands of weeds such as Lamb's-quarters (*Chenopodium album*), Russian-thistle (*Salsola pestifer*), Kochia (*Kochia scoparia*) and Sow-thistle (*Sonchus arvensis*) grow on the exposed slopes. A nearby cut from road construction during 1963-64 shows a slight improvement but the prevalent flora includes exotic species such as Yellow Sweet-Clover (*Melilotus officinalis*), Canada Thistle (*Cirsium arvense*) and Perennial Sow-thistle. Gullies up to four feet deep are still eroding there.

Before the slopes were destroyed, a dry grassland dominated by Spear Grass (*Stipa commata*), Blue Grama Grass (*Bouteloua gracilis*), Wheat Grasses (*Agropyron spp.*), and Prickly-pear Cactus (*Opuntia polyacantha*) prevailed. A diversity of other prairie plants flourished. The hillsides, which had a history of little grazing pressure and occasional fires, were essentially a natural landscape, the type of ecosystem that the Qu'Appelle Basin Report emphasizes should not be disrupted. Now the slopes support nox-

ious weeds and the beauty of the area has been marred by a maze of roads, the overpass, and the scarred hillsides. By locating the junction of these roads outside the valley, the whole problem could have been averted.

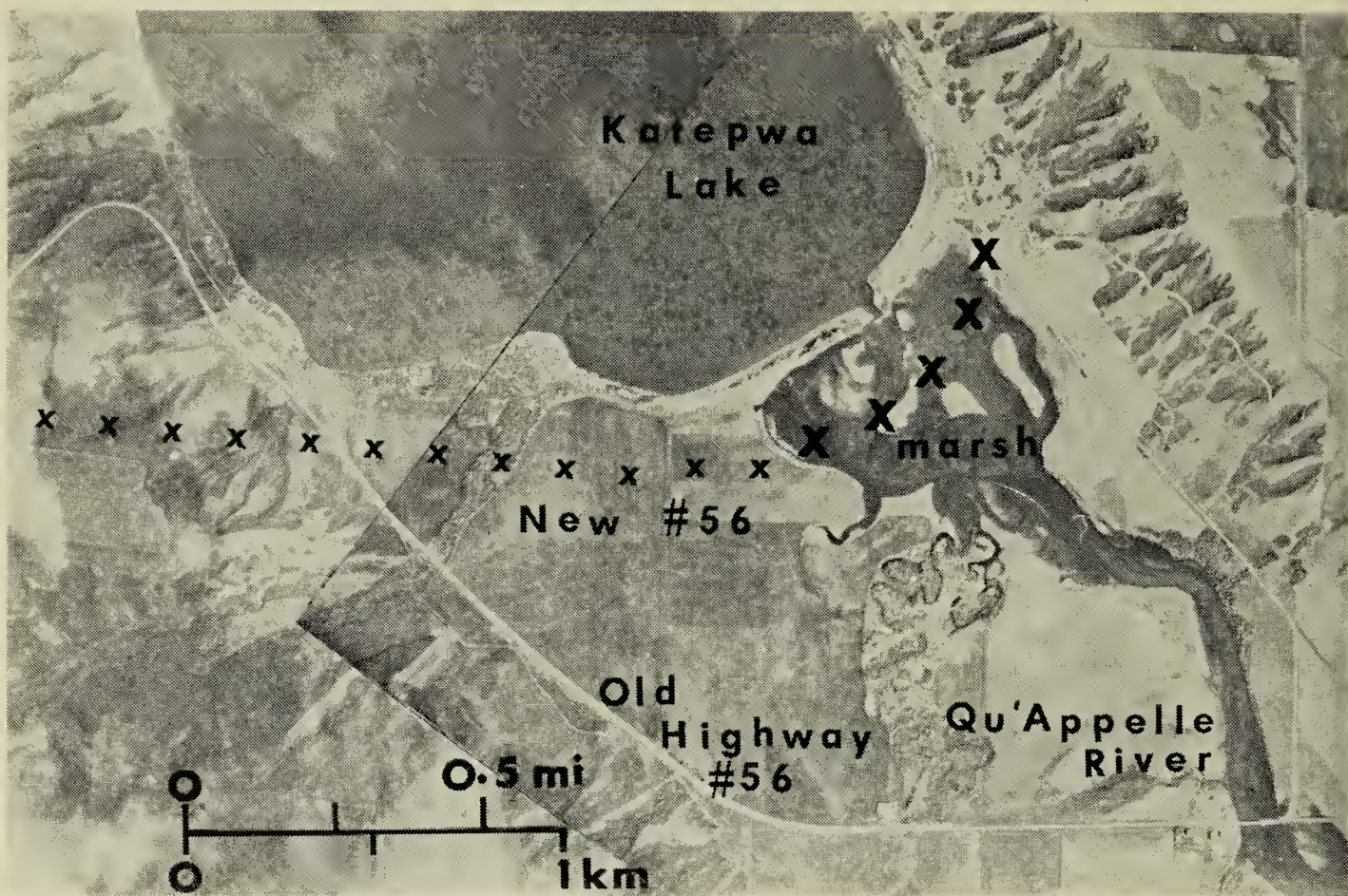
### Highway 6 North of Regina

The relocation of #6 Highway north of Regina has had similar, but less extreme, kinds of detrimental effects. Erosion also occurs at this site and the sparse vegetation consists of weeds. There has been no attempt to revegetate the abandoned part of the old highway.

### Highway 56 East of Katepwa Lake

The rerouting of Highway 56 east of Katepwa Lake during 1975-76 constitutes a classical example of environmental ignorance or neglect on the part of a government agency. The new road passes directly through a marsh identified as a major fish-spawning area during the Qu'Appelle Basin Study. This wetland was of added significance to waterfowl and other wildlife. During highway construction, the river was channelized and the water level in the marsh declined, greatly diminishing its value as fish and wildlife habitat. Apparent-





Route of #56 Highway round Katepwa Lake

Jim Hines

ly, other government agencies were not consulted before the road was built and construction was underway before its need could be questioned or its potential impact considered. The rerouting of Highway 56 was unnecessary as it shortens the distance travelled to the northwest side of the valley by only two miles. At that point it rejoins the old roadway. Based on average speeds of 60 miles per hour on the 2.2 miles of new highway and 40 m.p.h. on the old stretch, a motorist would save only 4.1 minutes by travelling on the new route. Should the natural quality of the valley be sacrificed (at considerable expense to the taxpayer) for dubious "improvements" such as this?

### **Grid Road between Craven and Highway 6**

The road along the northside of the valley between Craven and Highway 6 is being modified to improve local farm access and to provide an alternate route to Regina during springs when Highway 20 is inundated by flood waters. Because the road is being "upgraded" to a 28 foot width, 60

mile per hour standard, fill will be "borrowed" from some hills, some curves will be straightened, and the steep hillsides will be contoured. This could cause even greater damage than that witnessed at the previously mentioned locations. Much of the problem would be avoided if a narrower, lower speed road was constructed along the original route.

### **A Change in Attitude?**

The Department of Highways is either not aware of the recommendations of the Qu'Appelle Basin Study Board (which clearly opposes developments which are so damaging to the environment of the valley), or is ignoring these guidelines. Certainly, the attitude of some members of the department seems to be that "the hillsides look better when we are through with them" (a quotation from a Department of Highways official), but surely this indifference is not too widespread or impossible to change. Also at fault must be the Qu'Appelle Implementation Branch of the Department of the Environment (set up to carry out the





Grid Road entering the valley near Craven

Gary W. Seib

recommendations of the 1972 report) which has been neglectful in dealing with potential environmental damage.

Policies recently formulated by the provincial Department of the Environment and the Department of Municipal Affairs should help protect the valley from destructive projects in the future. The Department of the Environment will require that the potential impact is assessed for all major development projects, projects which might limit a resource, or are otherwise of major public concern. Recent amendments to the Planning and Development Act, administered by Municipal Affairs, will help guarantee that environmental damage and local socio-economic concerns are evaluated before new road construction is undertaken in the Qu'Appelle. These are both commendable steps which should do away with the current double standard that exists concerning impact statements — some agencies (such as the Saskatchewan Power Corporation) must comply with a strict set of rules which are seemingly ignored by (or not applied to) other agencies such as Highways. We hope that all agencies will have to adhere to a stricter set of standards in the future.

It is also hoped that at a time when

the nebulous philosophy of "growth for the sake of growth" is being questioned, the Department of Highways will reconsider its "building roads for the sake of building roads" ideology and make environmental protection a major priority. Assessment of potential impact and the development of procedures for landscaping and reclamation must become priorities in the planning stages if new roadways are to be compatible with the environment. To accomplish this, the department will need to consult specialists trained in disciplines such as ecology, hydrology, pollution control and landscape architecture.

Saskatchewan could learn a valuable lesson from the "Community and Environmental Factors Unit" of the California Division of Highways, which uses a multi-disciplinary approach to ensure that environmental factors are prominent in highway decision-making.<sup>8</sup> Other states have also taken a positive approach in reclaiming roadside right-of-ways with native prairie plants.<sup>4 5</sup> Such restored prairies represent one of the last sanctuaries for the native grassland flora in many states and are also excellent for the prevention of soil erosion. Properly managed rights-of-way are productive wildlife habitat



and frequently support the highest nesting densities of upland gamebirds and ducks.<sup>6</sup> This type of habitat is especially important in intensively farmed lands where there is little other cover left for wildlife. With the introduction of a diversity of native plants, the roadside margins will support many kinds of animals.

Oetting<sup>6</sup> earlier suggested that the right-of-way resource could best be used for the conservation of native fauna and flora. In so doing, this vast acreage would be transformed from a liability (the maintenance cost for Saskatchewan highways and provincial roads was more than one million dollars in 1970) into a public asset. More importantly, the largely sterile, easily eroded, and unappealing roadsides would be converted into a healthy and scenic natural environment.

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Frost crystals

R. E. Gehlert





Northern Lights

Fred W. Lahrman

## KEOEEIT

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The title is often the most difficult part of an article. *Aurora borealis* or northern lights would have been fine, but only keoeit, an Eskimo word, evokes mystery, legends and romance. The Inuit believed the aurora to be the torches of spirits, guiding souls to a land of happiness and plenty. The Indians of the Pacific coast thought it was the cooking fires of Eskimos, boiling whale blubber. My grandfather explained it as a reflection of the sun off the polar

icecap. For two thousand years men have marvelled at the northern lights, but it has only been in the last few decades that physicists have been able to offer a scientific explanation.

The earth is like a magnet, with a magnetic field extending between the polar regions (Fig.1). When we speak of auroral activity, we are indirectly speaking about the sun. Disturbances in the sun's atmosphere, known as flares and prominences,



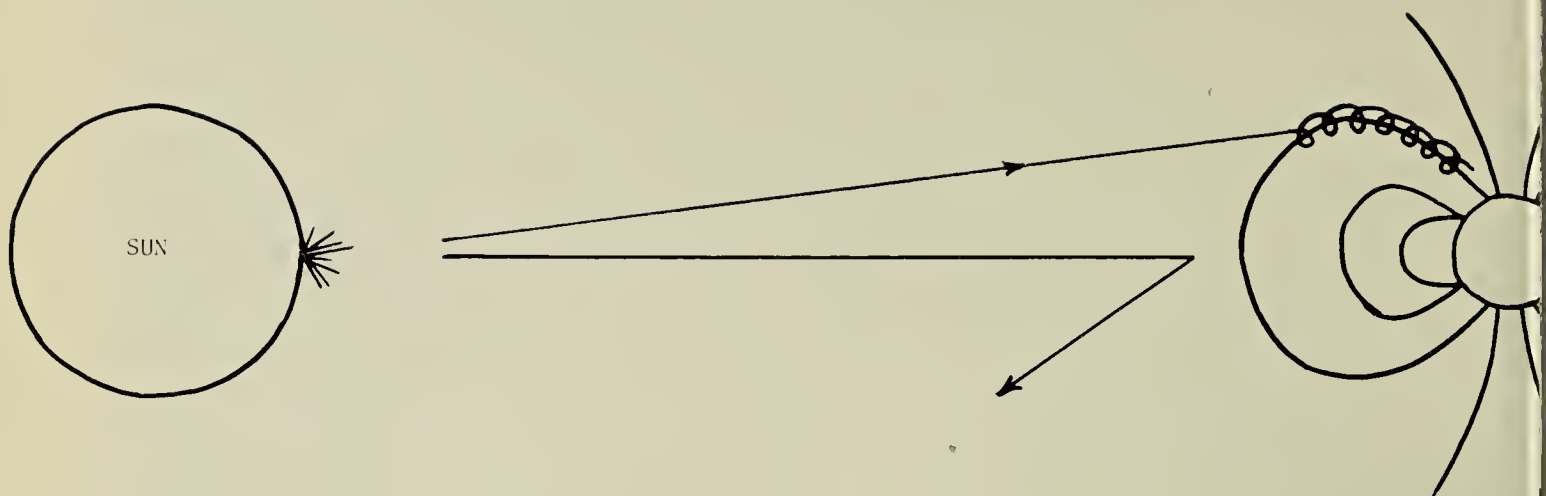


Fig. 1: The earth's magnetic field determines the destiny of solar particles. Annual frequency of visible auroras in varying latitudes.

produce showers of electrically charged particles (mainly protons and electrons) that storm the earth. The showers of particles are most frequent and intense when groups of sunspots appear on the sun's surface. The destiny of these particles is dependent on the angle at which they encounter the earth's magnetic field. Those that strike at right angles, as occurs at the equator, are deflected back into space. Those striking northern latitudes are parallel to the magnetic field and succeed in penetrating the upper atmosphere. Once within the atmosphere they collide with molecules of nitrogen and oxygen. With every collision the molecules absorb energy. When they return to normal, the energy is dissipated as visible light. Voilà, the *aurora borealis*. Therefore, the greater the sunspot activity, the greater the production of protons and electrons and the more spectacular the aurora. Also, highly energetic particles may overcome the magnetic field at low latitudes, explaining the periodic occurrence of "lights" in southern regions. An aurora in the north will always have a counterpart in the southern hemisphere. Captain James Cook called this the *aurora australis*.

Anyone who has witnessed the

northern lights can testify to their changeable mood. Colour, form and intensity continually fluctuate. Occurring at an altitude of 60 miles, or 100 kilometers, the predominant colour is yellow-green with highlights of red and blue. The aurora is not totally sporadic but follows an annual pattern. The months surrounding the equinoxes (March-April and September-October) are peak periods. At these times the earth's axis is at right angles to the earth-sun direction, so that the sun is directly overhead at noon on the equator, and the poles are equally distant from the sun.

The existence of "auroral sounds" was debated for years. The early Arctic explorers described it as "a soft swishing sound" and the Inuit compared it to the sound of reindeer joints. Recently, infrasonic waves have been identified, but these are imperceptible to the human ear.

The aurora presents a special challenge to the photographer. Conventional light meters are hopelessly inadequate, since a bright aurora is only 1/500 as intense as a bright sunset. Rural areas avoid the glare seen over cities and are preferable for viewing as well as photography. Try f4, 30-60 seconds with a film rated at ASA 200.



A conquest of geomagnetism and nuclear physics, the *aurora borealis* no longer puzzles the minds of men. But what of mystery, legends and romance? How do we react now, for example, to Robert Service's speculations in his "Ballad of the Northern Lights":

Some say that the Northern Lights  
are the glare of the Arctic ice

and snow;  
And some that it's electricity, and  
nobody seems to know.  
But I'll tell you now-- and if I lie,  
may my lips be stricken dumb--  
It's a mine, a mine of the precious  
stuff that men call radium.  
It's a million dollars a pound, they  
say, and there's tons and tons in  
in sight.  
You can see it gleam in a golden  
stream in the solitudes of night.



Northern Lights

Fred W. Lahrman



# BUTTERFLIES AND SKIPPERS OF WEST-CENTRAL ALBERTA

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Until recently, very few extensive investigations into the natural history of west-central Alberta had been carried out. The prospect of a pipeline carrying arctic gas through the area and an interest in the impact of existing natural gas processing plants on the environment however, led to numerous ecology study programs. Although largely carried out for private companies, many of these environmental reports, such as the Canadian Arctic Gas Biological Report Series<sup>1</sup> have been made public. These studies were largely inventory oriented and dealt with entire communities as well as single groups of birds, mammals and plants. One group about which very little has been published though, is the Lepidopterans, especially the butterflies and skippers. Several people have made collections of butterflies in different parts of west-central Alberta during the past hundred years or so, and most of these specimens have been examined by the authors. Ted Pike, for example has collected extensively along highways 16 and 43, and also in the Hinton area. In addition, J.W. Case carried out field work on butterfly faunistics throughout west-central Alberta while conducting research into air pollution impact around natural gas plants. It is this on which the present paper is largely based.

As defined here, west-central Alberta, a moderate to strongly rolling region, lies between 53 to 57 degrees north latitude and 114 to 120 degrees west longitude (Fig. 1) and comprises roughly 135,000 square kilometres. Rising 300-600 m above the lowlands is a series of flat-topped dissected plateaux known collectively as the Swan Hills. A small portion of the Rocky Mountains is included in the extreme southwest part of the study area. The majority of the area is drained by the Peace River. Most of

the remainder is in the Athabasca River Watershed, while the rest is in the North Saskatchewan River Watershed.

The area is biologically diverse and complex. In the extreme northwest are the unique Peace River parklands which have close floristic similarities to the aspen parkland to the south and east. The Peace River grassland is dominated by wheat grass (*Agropyron dasystachyum*) and needle grass (*Stipa spartea*), which are found on dry south-facing slopes and well drained hill tops. June grass, prairie crocus, pasture sagewort, showy locoweed, and fragile prickly-pear cactus are also found here. Aspen groves occur in moister or more sheltered places in the grasslands. Many shrubs and herbs occur within and around these aspen bluffs including Saskatoon-berry, roses, chokecherry, pin cherry, buckbrush, wild sarsaparilla, American vetch, yellow pea vine, northern bedstraw and wild strawberry. This parkland habitat supports several butterflies typical of the aspen parkland of southern Alberta, including the Dreamy Dusky Wing, Persius Dusky Wing, Gothic Swallowtail, Western Checkered White, Melissa Blue, Greenish Blue, White Admiral, Jenistai Fritillary, Mormon Fritillary, Common Wood Nymph, Varuna Arctic, and Common Alpine. Sloughs are the place to look for the Bronze and Purplish Coppers.

In many areas, aspen dominates extensive stands of mixed forest with white spruce and lodgepole pine as subordinate tree species. The undergrowth is similar to that of the bluffs described above. Many butterflies are associated with these woods, including the Arctic Skipper, Northern Cloudy Wing, Mustard White, Large Marble, Scudder's Blue, Western Tailed Blue, Silvery Blue,



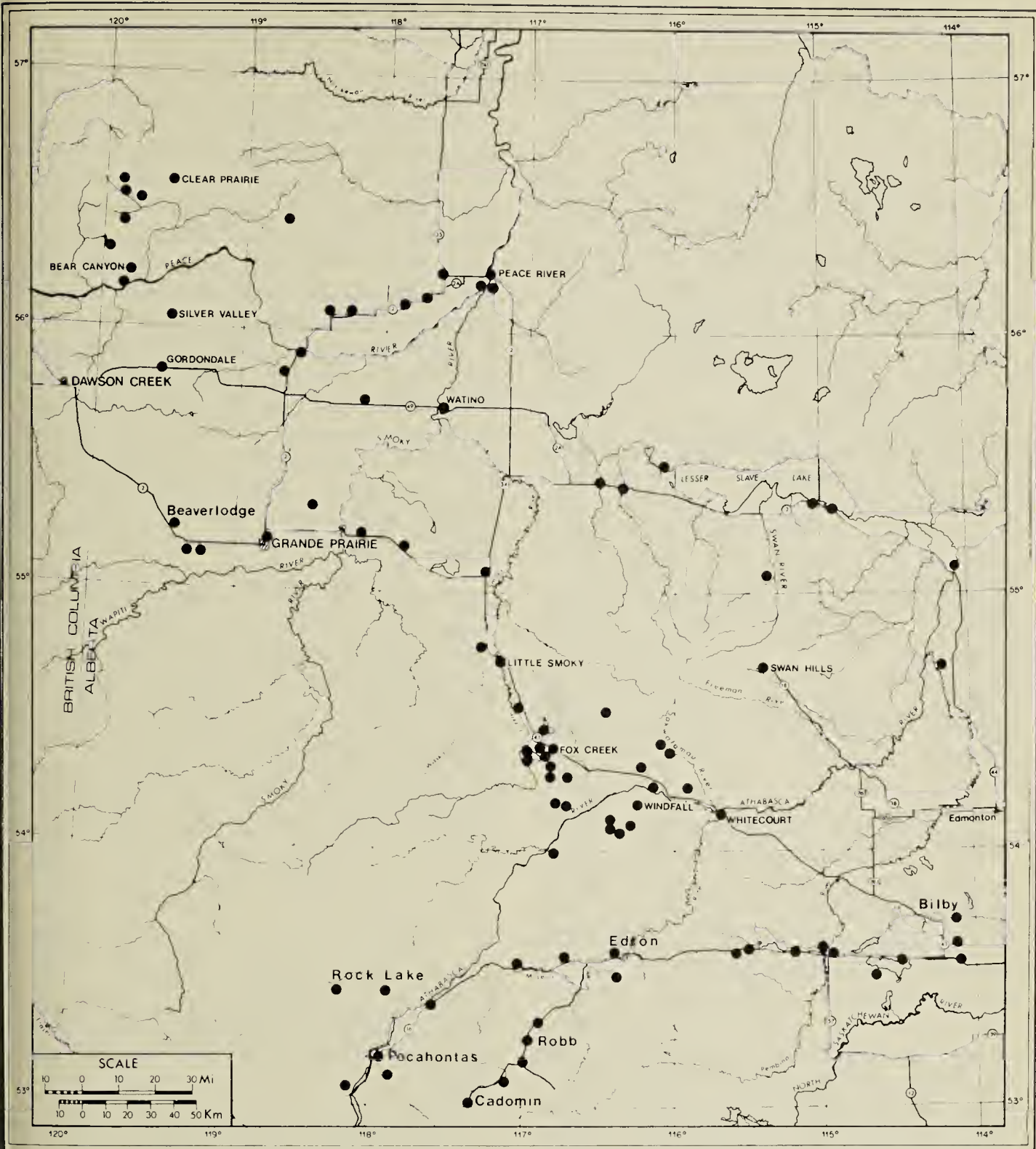


Fig. 1. Placenames and location of known butterfly collection sites in west-central Alberta.

Satyr Angle Wing, Gray Comma, Atlantis Fritillary, and Cary's Arctic.

Other parts of the study area are covered by mixed coniferous woods. Lodgepole pine dominated forest frequently occurs in well drained areas that have been burned over in the last century. Seedlings of white spruce, balsam fir and aspen are usually present in the understory. Many shrubs are also present, including low bush cranberry, blueberries, Labrador tea, bog

cranberry, and thimbleberry (*Rubus parviflorus*). Common herbs here are twin-flower, bunchberry, Bishop's cap, goldthread (*Coptis trifoliata*), Prince's pine, oak-leaf fern (*Gymnocarpium dryopteris*), dewberry, fireweed and blue-joint grass (*Calamagrostis canadensis*). These forests are also the home of the Pink-edged Sulphur, Mariposa Copper, and Purple Lesser Fritillary.

Pines showing varying degrees of introgression with Jack pine occur in



sand dune areas. A species poor understory is dominated by bearberry, hairy wild rye, harebell and Canada buffalo berry. Christina Sulphurs, Hoary Elfins, and Brown Elfins are found in this habitat.

White spruce forest is found over a wide range of edaphic conditions. Balsam fir, paper birch, aspen and lodgepole pine are frequently subordinate trees. A species rich understory frequently includes such interesting plants as common nettle, ground cedar (*Lycopodium obscurum*), stiff club-moss (*L. annotinum*), broad spinulose shield fern (*Dryopteris dilatata*), single delight (*Moneses uniflora*), Devil's club (*Oplopanax horridum*), false mitrewort (*Tiarella trifoliata*), gooseberries, red elder (*Sambucus pubens*), mountain ash, and twisted stalk (*Streptopus amplexifolius*). Butterflies found in or near these woods include the Hudsonian Old World Swallowtail, Green Comma, Atlantis Fritillary and Macoun's Arctic.

Black spruce dominates gentle slopes or undulating terrain with poorly drained soils. In very poorly drained places black spruce — peat moss bogs occur. Characteristic species of this complex are tamarack (*Larix laricina*), cloudberry (*Rubus chamaemorus*), swamp laurel (*Kalmia polifolia*), bog Rosemary (*Andromeda polifolia*), small bog cranberry (*Oxycoccus microcarpus*) and swamp birch. In better drained places, feather mosses dominate an understory otherwise made up largely of Labrador tea and reindeer lichen (*Cladonia* spp.). Black spruce dominated woods or bogs are the place to watch for the Giant Sulphur, Dorcas Copper, Bog Fritillary, Frigga Fritillary, Jutta Arctic and Mancinus Alpine.

Various stages of primary succession occur on stream and river flood plains. The Spring Azure is often abundant in such areas of riverine forest.

The extreme southwestern part of the study area includes a portion of the Rocky Mountains in Jasper

National Park. Many butterflies found in this area are found nowhere else in western central Alberta. These upper foothills, subalpine and alpine areas were not visited by the authors and our knowledge of the butterfly fauna of the area is limited largely to specimens taken in the vicinity of Pocahontas by K. Bowman in the first part of the century. Future work in this area will undoubtedly reveal several mountain species besides the ones that are known from the area which include the following: Manitoba Skipper, Elis Sulphur, Astraea Sulphur, Nastes Sulphur, Creusa Marble, Hewitson's Checkerspot, Bean's Checkerspot, Hydaspe Fritillary, Bean's Arctic and Bruce's Arctic.

In addition to the natural habitats, man has produced a variety of new ones such as cultivated land, weedy clearings, farm yards, roadsides, seismic lines and pipeline right-of-ways. This has destroyed some natural habitat, and clearing of farm land has done the majority of that, but a multitude of new clearings has resulted where butterflies abound, feeding on flowers of alfalfa, clover and weeds. The borders of a road through aspen or mixed woods are an especially good place to watch for the Alfalfa Butterfly, Silvery Blue, Cabbage White, Greenish Blue, Long Dash, Tawny-Edged Skipper and Red Admirals.

The earliest known butterfly collections in west central Alberta were made near Peace River in 1893, by an unknown collector whose specimens are now preserved in the Canadian National Collection. James Fletcher collected a Northwestern Silverspot also in the Peace River area presumably around 1903, either before or after visiting F. H. Wolley Dod in Calgary. W. Klassen collected a Tiger Swallowtail at Beaverlodge in June of 1910. Between 1913 and 1925 K. Bowman made many collections near Pocahontas, Cadomin, Bilby, Beaverlodge, Coalspur and Wembley. Donald Mackie collected a large number of butterflies, including a Coral Hairstreak, near Bilby from 1921



to 1925. O. Bryant also made collections near Bilby in 1924. In 1940, C. L. Neilson collected several butterflies at Dunvegan, Brownvale, Fairview, Bluesky, Beaverlodge and Hualien. Ten years later, L. Burgess made a few collections near Beaverlodge. B. Hocking made collections near Wabamun in 1955 and Sundance in 1957. More recently, collections have been made by R. L. Anderson at Edson in 1958; D. Hughes, A. Pucat, M. A. MacGregor and F. D. Johanson at Flatbush in 1960; S. L. Skaley at Rycroft in 1966; J. Emond near Little Smoky in 1968; Brian Randall at Grande Prairie in 1968; R. Carcasson at Goodwin in 1969; Peter Kuchar near Vine Creek in 1970; Ted Pike at Grimshaw, Canyon Creek, Slave Lake, along highways 43 and 16, and in the Hinton area from 1972-77; J. Belicek near Nojack in 1973; C. D. Bird near Robb in 1974; G. J. Hilchie near Enilda in 1975 and near Little Smoky in 1977; W. Smith at Hilliard's Bay on Lesser Slave Lake in 1976; Vanny Case near Little Smoky in 1977; Bill Hills near Peace River in 1977; and J. W. Case throughout the area from 1974 to 1977.

## SPECIES LIST

The common and scientific names employed are essentially those of Hooper's "Butterflies of Saskatchewan".<sup>3</sup> Dates listed after the species are the known flight periods. Moss' "Flora of Alberta"<sup>6</sup> is the reference for the plant names. Records are of specimens taken by J. W. Case, unless another collector's name is given in parentheses. Sight records (SR) of the authors are also included.

### HESPERIIDAE — Skippers

PECK'S SKIPPER (*Polites coras*). July 23-24. Found in grassy clearings in white spruce and lodgepole pine woods. Known from Bilby (D. Mackie) and 46 km S of Fox Creek.

TAWNY-EDGED SKIPPER (*Polites themistocles*). July 2-4. Found rarely along roadsides in parkland areas. Known only from collections made at Bilby in 1924 by D. Mackie and O. Bryant.

LONG DASH (*Polites sonora dacotah*). June 29. A single, fresh male was taken in 1975 in a grassy clearing surrounded by aspen woods, 1 km NW of Little Smoky.

MANITOBA SKIPPER (*Hesperia comma manitoba*). Found in mountain meadows. Known only from near Pochahontas where a single male was collected by K. Bowman in June, 1918.

ARCTIC SKIPPER (*Carterocephalus palaemon*). May 29-July 1. Found along trails and in clearings bordered by aspen or mixed woods where it visits many different flowers. It has been collected in the Fox Creek area, near Little Smoky, and along the MacLean Creek 30 km N of Bear Canyon. Specimens taken at Bilby by D. Mackie in 1921, 1922 and 1925 were labelled as *Carterocephalus palaemon mesapano* but all of the other specimens more closely resemble *Carterocephalus palaemon mandan*. The differentiation between these subspecies has been based on size differences with the larger *mandan* occurring in the mountains and the boreal forest, while the smaller *mesapano* is found in the aspen parkland and prairies. Too much size overlap occurs to justify the recognition of two subspecies in the area at this time.

NORTHERN CLOUDY WING (*Thorybes pylades*). June 3-June 22. Found occasionally in moist mixed woods where the larval food plants, yellow pea vine and vetches, are abundant. Known from Little Smoky, along the Waskahigan River near Little Smoky, and Hilliard's Bay on Lesser Slave Lake (W. Smith).

ALPINE CHECKERED SKIPPER (*Pyrgus centaureae loki*). July 2-12. Purportedly found in foothills forest and alpine meadows. It is known in the study area from collections made by K. Bowman at Pochahontas in 1913 and 1921.

DREAMY DUSKY WING (*Erynnis icelus*). May 16-July 7. Found commonly along the edges of aspen and mixed woods. It has been collected at Bilby (D. Mackie), 20 km NNW of Whitecourt, in the Fox Creek area, 25 km NW of Fox Creek, Little Smoky, Pochahontas (K. Bowman), along MacLean Creek 30 km N of Bear Canyon, and 23 km WSW of Clear Prairie.

PERSIUS DUSKY WING (*Erynnis persius*). May 29-July 1. Found occasionally along the edges of aspen woods where it feeds on early flowering legumes. It has been collected near Fox Creek, Goodwin (R. Carcasson), Pochahontas (K. Bowman), and along MacLean Creek 30 km N of Bear Canyon.

### PAPILIONIDAE - Swallowtails

GOTHIC SWALLOWTAIL (*Papilio zelicaon gothica*). May 19-July 6. Found occasionally on dry hill tops or meadows in parkland. It is known from Bilby (D. Mackie), Nojack





James W. Case

A Tiger Swallowtail mud puddle club. These butterflies are swarming around a small puddle, apparently as a result of a craving for the salts present in such moist places. Note the Blues that are trying to join the club.

(J. Belicek), the Fox Creek area and along MacLean Creek 30 km N of Bear Canyon. This species was usually found flying with Tiger Swallowtails but was easily spotted because it appears distinctly darker than its companions.

**HUDSONIAN OLD WORLD SWALLOWTAIL** (*Papilio machaon hudsonianus*). May 29-July 22. Found in aspen parkland woods and in mixed woods. It is known from 6.4 km SW of Fox Creek, the Kleskun Hills, the Peace Hills 7 km S of Bear Canyon and 30 km N of Bear Canyon.

**TIGER SWALLOWTAIL** (*Papilio glaucus canadensis*). May 22-July 4. One of the commonest, and certainly one of the most obvious, butterflies anywhere, especially near aspen woods. It visits Labrador tea, clover, gardens and weedy roadsides. It is known from Bilby (D. Mackie), Pocahontas (K. Bowman), 2 km W of Nojack (T. Pike), 25 km NW of Whitecourt, the junction of the Athabasca River and Pine Creek (SR), Fox Creek, Little Smoky, along the Waskahigan River near Little Smoky, near Crooked Creek (T. Pike), near Peace River, 30 km N of Bear Canyon and Boundary Lake.

The first author experienced what could only be a classical case of simultaneous emergence of these butterflies in the late morning of July 1, 1976, 30 km N of Bear Canyon. The area had been visited the previous day and a few average — worn

specimens were seen, but the next day it seemed to be snowing Tiger Swallowtails. Most were fresh and many "puddle clubs" were observed during the next few days. Females were also seen laying eggs on aspen leaves.

#### **PIERIDAE - Whites, Sulphurs and Marbles**

**WESTERN CHECKERED WHITE** (*Pieris protodice occidentalis*). August 12-September 8. Found commonly in open parkland, usually in disturbed areas, where weedy mustards abound. It is known from Bilby (D. Mackie), 30 km NW of Whitecourt, along Marsh Head Creek, Rycroft (L. Skaley), and Boundary Lake.

**MUSTARD WHITE** (*Pieris napi oleracea*). May 22-August 12. Found in open areas in white spruce or mixed woods. It is known from Bilby (D. Mackie), George Lake (T. Pike), Lesser Slave Lake (T. Pike), Hilliard's Bay on Lesser Slave Lake (W. Smith), 19 km W of Wildwood (T. Pike), the gas plant near Fox Creek, 6.4 km SW of Fox Creek, 45 km SE of Fox Creek, 9.7 km SE of Pass Creek Forestry Tower, and Hondo (G. Hilchie). There is some indication that the ecological range of this species is being reduced as a result of competition with the introduced European Cabbage White, just as some of the local bird populations are suffering because of the starling invasion.

**CABBAGE WHITE** (*Pieris rapae*). July 15-



August 27. Found in gardens, fields and in forest clearing. It has been collected near Evansburg (T. Pike), Whitecourt, Silver Valley and Grande Prairie, but has been observed throughout the area south of the Peace River. This species was accidentally introduced into Quebec in about 1860 and rapidly spread throughout North America (Howe 1975). It has been a serious pest of cruciferous crops and is also replacing *Pieris napi* in many places.

**PALAENO SULPHUR** (*Colias palaeno chippewa*). June 11-July 12. This northern species has been occasionally picked up in the southern parts of the study area, but is more common near the mountains in the west. It is found in or near boggy areas where the food plants, *Vaccinium* species, occur. It is known from collections made by T. Pike in the vicinities of Evansburg, Nojack, Rock Lake and Cadomin.

**ELIS SULPHUR** (*Colias meadii*). August 18-30. This mountain species has been taken only in that part of the study area lying within Jasper National Park. K. Bowman found it at Pocahontas in 1915 and P. Kuchar collected it 55 years later along Vine Creek.

**ALFALFA BUTTERFLY** (*Colias eurytheme eurytheme*). June 12-July 12. Found rarely in agricultural areas where clover and alfalfa are cultivated. It has been collected once at Beaverlodge (D. Mackie) and twice 30 km N of Bear Canyon.

**ALFALFA BUTTERFLY** (*Colias eurytheme* var. *alberta*). Several specimens taken previously have been labelled as *Colias eurytheme* var. *alberta*. K. Bowman, who described this variety, collected several specimens in the Beaverlodge — Wembley area during 1924-25. C. L. Neilson took it again at Brownvale and Beaverlodge in 1940. It seems likely that all of these specimens are hybrids between *Colias alexandra christina* and *Colias eurytheme eurytheme*. Ferris<sup>2</sup> came to a similar conclusion. There have been no recent collections or observations of anything resembling these specimens.

**ALFALFA BUTTERFLY** (*Colias philodice eriphyle*). June 11-September 9. Found throughout the area, especially where pipeline right-of-ways, ditches and fields are seeded to clover and alfalfa. It has been collected at Boundary Lake, along MacLean Creek 30 km N of Bear Canyon, 19 km NW of Whitecourt, 5 km W of Edson (T. Pike), Little Smoky, in the Fox Creek area, 9.7 km SE of Pass Creek Forestry Tower, Eureka River, 40 km NW of Whitecourt, 30 km WNW of Whitecourt, 35 km NW of Whitecourt and 40 km N of Swan Hills, near Beach Corner (T. Pike) and in the Evansburg area (T. Pike).

**PINK-EDGED SULPHUR** (*Colias interior interior*). May 22-August 24. Found commonly along roads and trails through mixed woods where the larval food plants, *Vaccinium* spp., are common. K. Bowman collected this species at Pocahontas in 1921, and L. Burgess took it at Beaverlodge in 1950. Recently, it has been collected in the vicinities of Fox Creek, Little Smoky (Vanny Case), Robb (C. D. Bird), Boundary Lake, Bear Canyon and MacLean Creek 30 km N of Bear Canyon.

**GIANT SULPHUR** (*Colias gigantea gigantea*). June 18-July 12. Found occasionally in wet meadows near mixed woods or brushland dominated by willows, which are the food plants. It is known from the vicinities of Pocahontas (K. Bowman), Hondo (G. Hilchie), Bilby (D. Mackie), near Evansburg (T. Pike), 19 km W of Wildwood (T. Pike), near Crooked Creek (T. Pike), 8 km E of Whitecourt (T. Pike), 6 km E of Granada (T. Pike) and MacLean Creek 30 km N of Bear Canyon.

**CHRISTINA SULPHUR** (*Colias alexandra christina*). June 26-August 14. Found at the edges of aspen or mixed woods where the food plants, legumes, are common. It is known from the vicinities of Beaverlodge (K. Bowman), Hinton (D. E. Scovell), MacLean Creek 30 km N of Bear Canyon, 22 km N of Bear Canyon, Wembley (K. Bowman), Beaverlodge (K. Bowman), Brownvale (C. L. Neilson), Robb (C. D. Bird), Coalspur (K. Bowman) and Pocahontas (K. Bowman).

**ASTRAEA SULPHUR** (*Colias alexandra astraea*). August 27. Purportedly found in open areas in foothills. It is known from the vicinities of Pocahontas (K. Bowman), Cadomin (T. Pike) and Shaw (T. Pike).

**NASTES SULPHUR** (*Colias nastes streckeri*). July 2. This mountain species is found in alpine meadows and on ridges. It is known only from the vicinity of Pocahontas (K. Bowman).

**CREUSA MARBLE** (*Euchloe creusa*). June 19-July 12. Purportedly found in open coniferous woods and meadows. It is known from the vicinities of Pocahontas (K. Bowman), Rock Lake (T. Pike) and Cadomin (T. Pike).

**LARGE MARBLE** (*Euchloe ausonides ausonides*). May 29-July 11. Found commonly along roadsides and in mixed forest wherever there are wild or weedy mustards. It is known from the vicinities of Robb (T. Pike), 13 km S of Edson (T. Pike), Fox Creek, Hilliard's Bay on Lesser Slave Lake (W. Smith), Canyon Creek (T. Pike), Grimshaw (T. Pike), Bear Canyon, MacLean Creek 30 km N of Bear Canyon and Boundary Lake.



## LYCAENIDAE — Gossamer-winged Butterflies

**CORAL HAIRSTREAK** (*Chrysophanus titus immaculosus*). Purportedly found in open woods, ravines and valleys of the parkland where choke-cherry is common. It is known only from the vicinity of Bilby (D. Mackie).

**HOARY ELFIN** (*Callophrys polios obscurus*). April 15-May 28. Reported to occur in lodgepole pine woods on sand dunes. It is known from the vicinities of Bilby (D. Mackie), Pocahontas (K. Bowman) and Goodwin (R. Carcasson).

**BROWN ELFIN** (*Callophrys augustinus*). April 16-May 30. Found in black spruce woods and nearby open lodgepole pine woods where blueberry (*Vaccinium* spp.), bog laurel (*Kalmia polifolia*), bog cranberry (*Oxycoccus microcarpus*) and bearberry are available. It is known from the vicinities of Pocahontas (K. Bowman), Bilby (D. Mackie), near the Iosegun River campground and Fox Creek.

**WESTERN ELFIN** (*Callophrys eryphon eryphon*). April 17-May 30. Found in pine woods. It is known from the vicinities of Pocahontas (K. Bowman) and Fox Creek.

**BRONZE COPPER** (*Lycaena thoe*). July 10-September 5. Found in wet meadows. Known only from collections made by D. Mackie near Bilby between 1921-26.

**MARIPOSA COPPER** (*Lycaena mariposa mariposa*). July 10-August 3. Found occasionally in mixed coniferous woods on wet soil. It is known from the vicinities of Robb (C. D. Bird), Edson (R. L. Anderson) and MacLean Creek 30 km N of Bear Canyon.

**PURPLISH COPPER** (*Lycaena helloides*). July 19- August 3. Found around sloughs and marshes where the larval food plants, dock and knotweed, are found. It is known from the vicinities of Robb (C. D. Bird) and Bilby (D. Mackie).

**DORCAS COPPER** (*Lycaena dorcas dorcas*). July 1-July 9. Found in wet black spruce bogs or other marshy areas where *Potentilla* species grow. It is known from the vicinities of Boundary Lake, MacLean Creek 30 km N of Bear Canyon and High Prairie (G. Hilchie).

**SCUDDER'S BLUE** (*Lycaeides argyrognomon scudderii*). June 17-August 30. Found commonly along roads through mixed woods and at the edges of aspen bluffs in parkland. It is known from the vicinities of Bilby (D. Mackie), Pass Creek Tower, Kleskun Hills, MacLean Creek 30 km N of Bear Canyon, Robb (C. D. Bird), Cadomin (T. Pike), Shaw (T. Pike), Pocahontas (K. Bowman) and Vine Creek

(P. Kuchar).

**MELISSA BLUE** (*Lycaeides melissa melissa*). June 21-July 22. Found in virgin prairie areas of the Peace River parkland, which has all but disappeared. It is known from the vicinities of Wembley (K. Bowman), Sagitawa Lookout near Peace River, Grande Prairie and the Kleskun Hills.

**GREENISH BLUE** (*Plebejus saepiolus amica*). June 11-August 12. Found in parkland along roads, trails, cutlines, damp meadows and wastelands. It is known from the vicinities of Beach Corner (T. Pike), Evansburg (T. Pike), Granada (T. Pike), Bilby (D. Mackie), Nojack (T. Pike), Whitecourt (T. Pike), Hilliard's Bay on Lesser Slave Lake (W. Smith), 40 km SE of Fox Creek, Pass Creek Tower, Little Smoky, Crooked Creek (T. Pike), Peace River, Gordondale, Kleskun Hills, Bear Canyon, MacLean Creek 30 km N of Bear Canyon and Boundary Lake.

**YUKON BLUE** (*Plebejus optilete yukona*). July 4-12. Rarely found in coniferous woods and bogs where bog cranberries (*Vaccinium vitis* and *Oxycoccus micrococcus*) are common. It is known from the vicinity of Bilby, where it was collected by D. Mackie and K. Bowman in 1922-23, and from 30 km SE of Little Smoky, where it was taken by G. Hilchie and T. Pike in 1977.

**MEGALO ARCTIC BLUE** (*Plebejus aquilo megalos*). June 8-July 14. Found near aspen or pine woods and in the mountains near the tree line. It is known from the vicinities of Beaverlodge (D. Mackie), Cadomin (T. Pike) and Pocahontas (K. Bowman).

**WESTERN TAILED BLUE** (*Everes amyntula albrighti*). May 29-July 28. Abundant in and around aspen or mixed woods where the food plants, which include vetches and yellow pea vine, are found. It is known from the vicinities of Bilby (D. Mackie), Nojack (T. Pike), Whitecourt (T. Pike), Fox Creek, Little Smoky, the Waskahigan River near Little Smoky, Rock Lake (T. Pike), Pocahontas (K. Bowman), Goodwin (R. Carcasson), Peace River, 33 km W of Watino, Gordondale, MacLean Creek 30 km N of Bear Canyon, Bear Canyon and Boundary Lake.

**SILVERY BLUE** (*Glaucopsyche lygdamus couperi*). May 14-July 17. Found commonly in clearings in or near aspen and balsam poplar woods, where it feeds with Western Tailed Blues on legumes. It is known from the vicinities of Wabamun (B. Hocking), Sundance (B. Hocking), Bilby (D. Mackie), Beach Corner (T. Pike), Goodwin (R. Carcasson), Rock Lake (T. Pike), Pocahontas (K. Bowman), Fox Creek, Little Smoky, along the Waskahigan River near Little Smoky, Peace River, Bear Canyon,





Greenish Blue

Gary Anweiler

MacLean Creek 30 km N of Bear Canyon and at Boundary Lake.

**SPRING AZURE** (*Celastrina argiolus lucia*). April 17-June 11. Found in poplar and mixed woods where it feeds on willows, strawberry and violets. It is known from the vicinities of Bilby (D. Mackie), Sundance (B. Hocking), the Sakwatimaw River about 20 km NNW of Whitecourt, 30 km NE of Windfall (SR), Fox Creek, Pine Creek, Little Smoky, near the Iosegun River campground and Pocahontas (K. Bowman).

#### **NYMPHALIDAE — Brush-footed Butterflies**

**WHITE ADMIRAL** (*Limenitis arthemis rubrofasciata*). June 29-August 15. Very common in aspen woods and along trails through such woods. It is known from the vicinities of Windfall (SR), Silver Creek (SR), Fox Creek, Peace River (SR), 33 km W of Watino, MacLean Creek 30 km N of Bear Canyon and at Boundary Lake.

**RED ADMIRAL** (*Vanessa atalanta rubria*). June 1 and October 9. Found in farm yards and waste places. Known from Bilby (D.

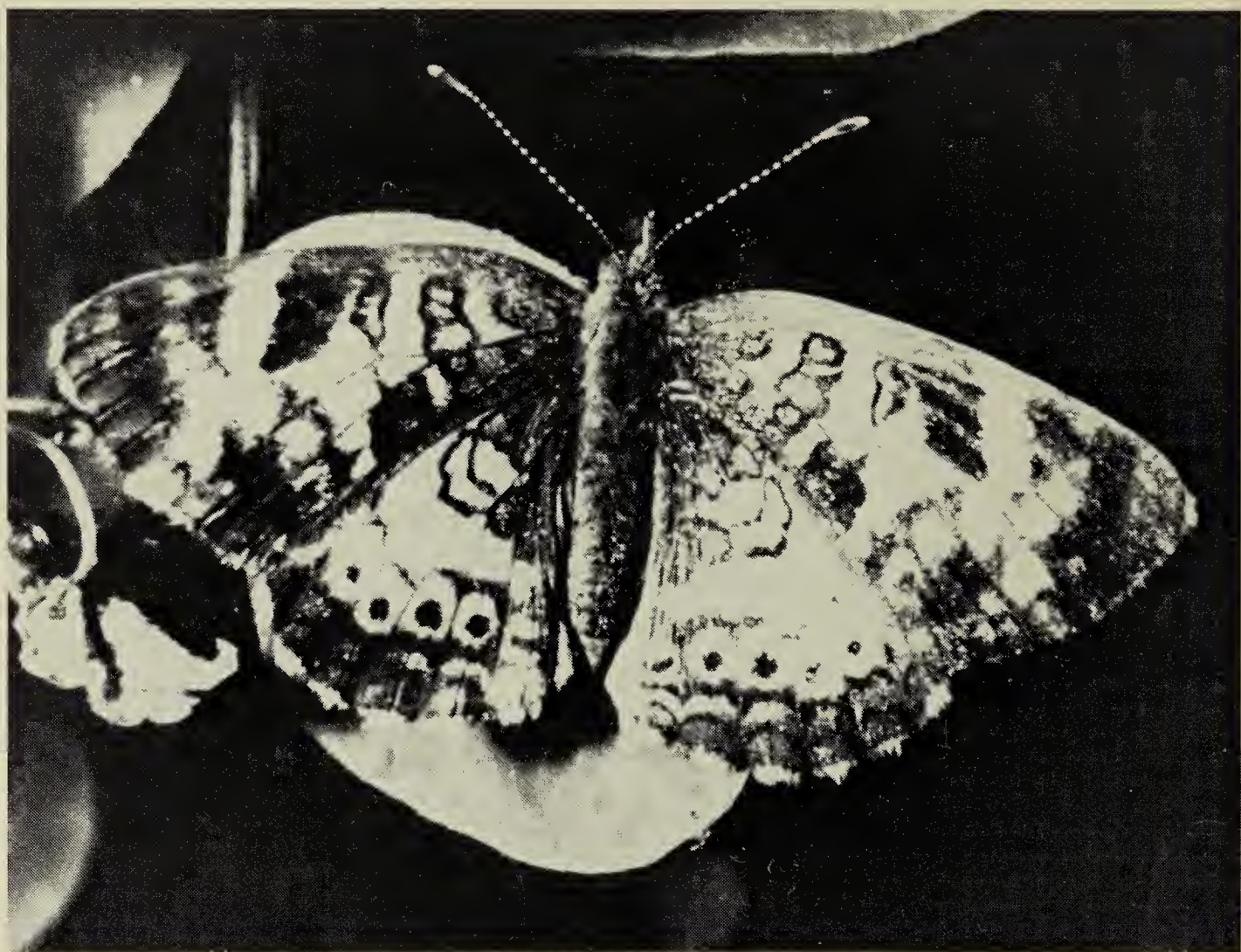
Mackie) and near Peace River (Bill Hills).

**PAINTED LADY** (*Cynthia cardui*). May 19. Known by several specimens taken by J. Belicek near Nojack. This species is rarely observed migrating into the area.

**COMPTON TORTOISE SHELL** (*Nymphalis vau-album watsoni*). August 7-September 17. Found occasionally in deciduous or mixed woods. It is known from the vicinities of Bilby (D. Mackie), and George Lake (T. Pike). These specimens were labelled as *Nymphalis vau-album j-album* but according to G. A. Gorelick's treatment of the genus in, "The Butterflies of North America"<sup>4</sup> the subspecies *j-album* is found in the eastern part of the (transcontinental) range while "The subspecies name *watsoni* (Hall) applies to those populations occurring in northern Wyoming, Montana, Alberta, British Columbia and Alaska"

**MILBERT'S TORTOISE SHELL** (*Nymphalis milberti furcillata*). May 21-September 17. Found commonly wherever the principal host plant, common nettle, is found. It is known from the vicinities of Swan Hills, Windfall (SR), Pine Creek, 14 km W of Fox Creek, MacLean Creek 30 km N of Bear





Pearl Crescent

Frank A. Switzer

Canyon and Eureka River.

**MOURNING CLOAK** (*Nymphalis antiopa antiopa*). May 5-September 5. Found commonly in aspen and mixed coniferous woods. It is known from the vicinities of Bilby (D. Mackie), Flatbush (M. A. MacGregor), Whitecourt (SR), Windfall (SR), Fox Creek (SR), Smoke Lake (SR), the junction of the Athabasca River and Pine Creek (SR), Rock Lake (T. Pike), 32 km S of Valleyview (J. Emond) and Beaverlodge (K. Bowman).

**SATYR ANGLE WING** (*Polygonia satyrus satyrus*). April 29-September 18. Found occasionally in mixed woods and alluvial forest communities where the larval food plants, nettles, are found. It is known from the vicinities of Bilby (D. Mackie), George Lake (T. Pike, P. Graham), Lesser Slave Lake (T. Pike), 30 km WNW of Whitecourt, 47 km SSE of Fox Creek, Little Smoky and Beaverlodge (L. Burgess).

**ZEPHYR ANGLE WING** (*Polygonia zephyrus*). May 5-August 28. Found rarely in white spruce woods where the larval food plants, wild currants and gooseberries, are found. It is known from the vicinity of George Lake (T. Pike), Lesser Slave Lake (T. Pike), Cadomin (K. Bowman), Rock Lake (T. Pike) and Pocahontas

(K. Bowman).

**GRAY COMMA** (*Polygonia progne*). April 23-September 18. Found in aspen woods or brushland where it lays its eggs on the leaves of wild currants and gooseberries. It is known from the vicinities of Wabamun (K. Bowman), George Lake (T. Pike), Bilby (D. Mackie), Cadomin (K. Bowman), and Pocahontas (K. Bowman).

**GREEN COMMA** (*Polygonia faunus rusticus*). April 29-June 21. Found in white spruce and mixed coniferous woods. It is known from the vicinities of Bilby (D. Mackie), George Lake (T. Pike), Flatbush (A. Pucat), Hilliard's Bay on Lesser Slave Lake (W. Smith), 35 km NW of Whitecourt, 30 km WNW of Whitecourt, 19 km NW of Whitecourt and Pocahontas (K. Bowman).

**PEARL CRESCENT** (*Phyciodes tharos tharos*). June 5-June 22, June 29-August 3. Found in meadows, along old trails at the borders of aspen woods and anywhere else asters grow. It is the most widespread butterfly and also one of the most abundant. It is known from the vicinities of Wabamun (D. Hocking), Bilby (D. Mackie), Granada (T. Pike), Evansburg (T. Pike), Whitecourt (T. Pike), Fox Creek, Little Smoky, along the Waskahigan River near Little Smoky, Crooked Creek (T. Pike), 33



km W of Watino, 9.7 km S of Peace River, Boundary Lake, 30 km N of Bear Canyon, the Peace Hills 6.4 km S of Bear Canyon, Hilliard's Bay on Lesser Slave Lake (W. Smith), Edson (R. L. Anderson), 33 km W of Edson (T. Pike), 9.7 km NE of Robb, Rock Lake (T. Pike), and 5 km W of Medicine Lodge (T. Pike).

**MEADOW CRESCENT** (*Phyciodes campestris campestris*). July 12. Known by a single collection from the Cadomin area (T. Pike).

**ANICIA CHECKERSPOT** (*Euphydryas anicia anicia*). June 19-July 12. Found in meadows near mixed woods. It is known from the vicinities of Pocahontas (K. Bowman), Rock Lake (T. Pike) and Cadomin (T. Pike).

**BEAN'S CHECKERSPOT** (*Euphydryas editha beani*). July 2. It is known only from the Pocahontas vicinity (K. Bowman).

**JENISTAI FRITILLARY** (*Boloria beliona jenistai*). May-August 27. Found in aspen woods where violets, the food plants, are common. It is known from the vicinities of Bilby (D. Mackie), Flatbush (R. Carcasson), along the Waskahigan River near Little Smoky and near MacLean Creek 30 km N of Bear Canyon.

**FRIGGA FRITILLARY** (*Boloria frigga saga*). May 29-August 17. Found in grassy black spruce-tamarack bogs where willows and cloudberry (*Rubus chamaemorus*) are common. It is known from the vicinities of Pocahontas (K. Bowman), Robb (T. Pike), Rock Lake (T. Pike), junction of the Grande Cache and Rock Lake roads (T. Pike), Evansburg (T. Pike), 19 km W of Wildwood (T. Pike), 5 km W of Medicine Lodge (T. Pike), 33 km W of Edson (T. Pike), 25 km NW of Whitecourt, 8 km E of Whitecourt (T. Pike), Fox Creek and Little Smoky.

**FREIJA FRITILLARY** (*Boloria freija freija*). May 14-June 19. Found in open, dry pine woods adjacent to black spruce bogs, especially common on stabilized sand dunes. It is known from the vicinities of Cadomin (K. Bowman), Robb (T. Pike), Rock Lake (T. Pike), Flatbush (F. D. Johanson), 25 km NW of Whitecourt, near the Iosegun River campground and Fox Creek.

**PURPLE LESSER FRITILLARY** (*Boloria titania grandis*). July 12-August 27. Found in spruce, pine and mixed forest where willows, one of the food plants are common. It is known from the vicinities of Flatbush (D. Hughes), Bilby (D. Mackie), Whitecourt, 30 km WNW of Whitecourt, 15 km N of Windfall, Fox Creek, Pass Creek Tower, Kleskun Hills, 70 km S of Grande

Prairie (G. Hilchie), Robb (C. D. Bird) and Cadomin (K. Bowman and T. Pike).

**BOG FRITILLARY** (*Boloria eunomia*). June 11-July 5. Found in black spruce woods and black spruce-peat moss bogs, where it feeds on Labrador tea. It is known from the vicinities of Bilby (D. Mackie), MacLean Creek 30 km N of Bear Canyon, Evansburg (T. Pike), Nojack (T. Pike), 19 km W of Wildwood (T. Pike), 3 km E of Entwistle (T. Pike), 2 km W of Granada (T. Pike), 13 km S of Edson (T. Pike), 5 km W of Edson (T. Pike), 5 km W of Medicine Lodge (T. Pike), 25 km E of Rock Lake (T. Pike), Enilda (G. Hilchie), Crooked Creek (T. Pike), 32 km E of Grand Prairie (T. Pike), MacLean Creek 30 km N of Bear Canyon and Boundary Lake.

**SILVER-BORDERED FRITILLARY** (*Boloria selene atrocotalis*). June 11-August 15. Found in moist areas along edges of mixed deciduous woods where the food plants, violets and strawberries, are common. It is known from the vicinities of Hilliard's Bay on Lesser Slave Lake (W. Smith), Evansburg (T. Pike), Beach Corner (T. Pike), 19 km W of Wildwood (T. Pike), Little Smoky, MacLean Creek, 23 km WSW of Clear Prairie, Windfall, 32 km NNW of Windfall, 8 km E of Whitecourt (T. Pike), Fox Creek, 46 km SE of Fox Creek, Crooked Creek (T. Pike), Robb (T. Pike) and 32 km W of Edson (T. Pike).

**MORMON FRITILLARY** (*Speyeria mormonia eurynome*). July 8-August 15. Found commonly in parkland areas or in open aspen woods. It is known from the vicinities of Pocahontas (K. Bowman), the Kleskun Hills, Bluesky (C. L. Neilson), Peace River (collected in 1893, possibly by James Fletcher), Huallen (C. L. Neilson), Fairview (C. L. Neilson) and 30 km S of Fox Creek.

**ATLANTIS FRITILLARY** (*Speyeria atlantis*). This group appears to be represented locally by three closely related subspecies. All three fly near aspen woods where the food plants, violets, are common, but are in different macrohabitats. Holland's Atlantis Fritillary (*Speyeria atlantis hollandi*) is common in continuous aspen or mixed woods. It is known from the vicinities of Coalspur, Edson (R. L. Anderson), Windfall, 15 km N of Windfall, 30 km WNW of Whitecourt, 19 km NW of Whitecourt, Pass Creek Tower, Fox Creek, 46 km SE of Fox Creek and the Kleskun Hills. It is known to fly from July 22 to August 27.

The range of Bean's Fritillary (*Speyeria atlantis beani*) apparently extends northward from southern Alberta along the mountains and thence eastward along





Common Wood Nymph

Gary Anweiler

the major river valleys such as the McLeod, Athabasca and Peace rivers. It is known from the vicinities of Pocahontas (K. Bowman), Robb (C. D. Bird), MacLean Creek 30 km N of Bear Canyon, and 26 km W of Clear Prairie. It is known to fly from July 7 to August 3.

The Northwestern Silverspot (*Speyeria atlantis helena*) however, seems to be restricted to the edge of aspen bluffs in prairie areas but more observations would be needed to confirm this. Specimens approaching this subspecies are known from the vicinities of Bilby (D. Mackle) and Peace River (James Fletcher). The breaking of land for cultivation has possibly eliminated much of its former habitat.

GREAT SPANGLED FRITILLARY (*Speyeria cybele pseudocarpenteri*). July 30-August

7. Found in open aspen woods or along the edges of aspen bluffs in parkland. It is known from the vicinities of Bilby (D. Mackie), and George Lake (T. Pike).

HYDASPE FRITILLARY (*Speyeria hydaspe sakuntala*). August 20. It is known only from the vicinity of Pocahontas (K. Bowman).

#### **SATYRIDAE — The Meadow Browns**

RINGLET (*Coenonympha tullia inornata*). May 28-July 10. Found in prairie areas. It is known from the vicinities of Bilby (D. Mackie), Evansburg (T. Pike), Nojack (T. Pike), Crooked Creek (T. Pike), Beaverlodge (K. Bowman), Wembley (K. Bowman), Peace River, Grimshaw and Bear Canyon.



COMMON WOOD NYMPH (*Cercyonis pegala ino*). July 22-24. Found in grassy clearings at the edges of aspen woods. It is known from the vicinity of Bilby (D. Mackie) and the Kleskun Hills.

VARUNA ARCTIC (*Oeneis uhleri varuna*). June 8-July 1. Found in prairie clearings in parkland areas. It is known from the vicinities of Peace River, Beaverlodge (C. L. Neilson), and Dunvegan (K. Bowman).

CARY'S ARCTIC (*Oeneis chryxus*). June 19-July 12. Found in lodgepole pine woods in areas of sandy soil. It is known only from the vicinity of MacLean Creek 30 km N of Bear Canyon, Cadomin (T. Pike) and Rock Lake (T. Pike). The specimens from MacLean Creek closely resemble *Oeneis chryxus caryi*.

MACOUN'S ARCTIC (*Oeneis macounii*). June 16-July 1. Found rarely in lodgepole pine and white spruce woods. It is known from the vicinities of Bear Canyon and Boundary Lake in the Peace River district. This species is named in honour of the famous Canadian naturalist, John Macoun (1831-1920), who explored the natural history of that area off and on between 1872-1875.

JUTTA ARCTIC (*Oeneis jutta*). June 11-July 12. Found in black spruce bogs. It is known from the vicinities of Bilby (D. Mackie), 19 km W of Wildwood (T. Pike), 13 km S of Edson (T. Pike), 5 km W of Medicine Lodge (T. Pike) and Fox Creek.

BEAN'S ARCTIC (*Oeneis melissa beanii*). July 2-July 12. Found in mountain areas of western Alberta. It is known only from the vicinity of Pocahontas (K. Bowman).

BRUCE'S ARCTIC (*Oeneis polixenes brucei*). June 29-July 12. Found above timberline in alpine meadows. It is known from the vicinities of Roche Miette (K. Bowman and Pocahontas (K. Bowman).

COMMON ALPINE (*Erebia epipsodea*). May 28-July 12. Found commonly in open prairie and near aspen bluffs in parkland. Three collections were made in the Peace River area in 1883 but the collector is unknown. It is also known from the vicinities of Beach Corner (T. Pike), Evansburg (T. Pike), Fox Creek, Little Smoky, Valleyview, Peace River, Grimshaw (T. Pike), Beaverlodge (K. Bowman), MacLean Creek 30 km N of Bear Canyon, 13 km S of Edson (T. Pike), Rock Lake (T. Pike), 5 km W of Medicine Lodge (T. Pike), Cadomin (T. Pike) and Pocahontas (K. Bowman).

MANCINUS ALPINE (*Erebia disa mancinus*). June 3-July 5. Found occasionally in black spruce woods or black spruce-sphagnum bogs. It is known from the vicinities of Bilby (D. Mackie), 19 km W of

Wildwood (T. Pike), Fox Creek, 19 km SE of Little Smoky, 13 km S of Edson (T. Pike), 5 km W of Medicine Lodge (T. Pike), Rock Lake (T. Pike), the junction of the Grand Cache and Rock Lake roads (T. Pike) and Pocahontas (K. Bowman).

RED DISKED ALPINE (*Erebia discoidalis macdunnoughi*). May 18-June 19. Rarely seen in some years, but in others it is abundant in prairie meadows, along cutlines through aspen woods and occasionally in dry pine woods, where grasses, the food plants, are abundant. It is known from the vicinities of Flatbush (R. Carcasson, M. A. MacGregor), Rock Lake (T. Pike) and Fox Creek.

### Expected Species List

A number of additional species are still likely to be found in the area. Most could be near the limits of their range. Future workers in the area should be on the lookout for the Roadside Skipper (*Amblyscirtes vialis*), Assiniboia Skipper (*Hesperia comma assiniboia*), Boreal Skipper (*Hesperia comma borealis*), Garita Skipper (*Oarisma garita*), Two Banded Skipper (*Pyrgus ruralis*), Northern Skipper (*Polites draco*), California White (*Pieris sisymbrii flavitincta*), Phlaeas Copper (*Lycaena phlaeas arethusa*), Snow's Copper (*Lycaena snowi*), Great Copper (*Lycaena xanthoides*), Rustic Arctic Blue (*Plebejus aquilo rustica*), American Painted Lady (*Cynthia virginensis*), California Tortoise Shell (*Nymphalis californica*), Variegated Fritillary (*Euptoieta claudia claudia*), Monarch (*Danaus plexippus plexippus*), and the Alberta Arctic (*Oeneis alberta alberta*).

<sup>1</sup>CANADIAN ARCTIC GAS PIPELINE COMMITTEE (eds.) 1973-1977. Arctic Gas Biological Report Series. 37 Vols. Calgary

<sup>2</sup>FERRIS, C. D. 1972. Notes on certain species of *Colias* (LEPIDOPTERA: PIERIDAE) found in Wyoming and associated regions. Bull. Allyn Mus., No. 6. 23 pp.

<sup>3</sup>HOOPER, R. R. 1973. Butterflies of Saskatchewan. Saskatchewan Dept. of Natural Resources. Regina. 216 pp.

<sup>4</sup>HOWE, W. (ed.) 1975. The Butterflies of North America. Doubleday and Company, Inc. Garden City, New York 633 pp.

<sup>5</sup>MOSS, E. H. 1955. The vegetation of Alberta. Bot. Rev. 21(9): 493-567.

<sup>6</sup>MOSS, E. H. 1959. Flora of Alberta. University of Toronto Press, Toronto. 546 pp.



# AQUATIC INVERTEBRATES IN A SMALL NORTHERN LAKE

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The invertebrate fauna of our small northern lakes can often be quite abundant and diverse, as we found while sampling Potato Lake for the availability of food for staging waterfowl in the spring of 1974. Potato Lake is a very small lake which is about 9 km south-east of the town of La Ronge, Saskatchewan, and which drains into Lac La Ronge. It is in boreal forest near the edge of the Canadian Shield. We collected only from the southern basin of the lake (which is joined to the main lake by a narrow channel) covering an area of about 1¼ km<sup>2</sup> with a maximum depth of about 2 m. There is a floating mat of vegetation extending out a couple of meters from the shore on which cattails (*Typha latifolia*) and horse-tails (*Equisetum* sp.) grow in abundance. Elsewhere the bottom consists of a fine black ooze.

Samples were taken along several different transects at each of four depths: on the floating mat just off shore, on the floating mat near its outer edge, just off the floating mat in about three feet of water, and farther from shore in about four feet of water. Vertical strata of water, including bottom material to a depth of six inches were sampled using a Dendy sampler. Duplicate samples were taken from the sites at three different times: in late May, in mid-June, and in late June.

The samples (Table 1) contained about 2/3 crustaceans, 10% insects and 12% seeds. Mollusks and annelids were also abundant. *Daphnia pulex* was by far the most abundant organism present, comprising nearly one half of all individuals collected. Other water fleas (*Eurycercus* and *Daphnia similis*), midge larvae, sideswimmers (*Hyalella azteca*), snails (*Gyraulus*), clams (*Pisidium*), copepods, seed shrimps

(*Ostracoda*), aquatic earthworms (*Oligochaetes*) and wild rice seeds were also abundant.

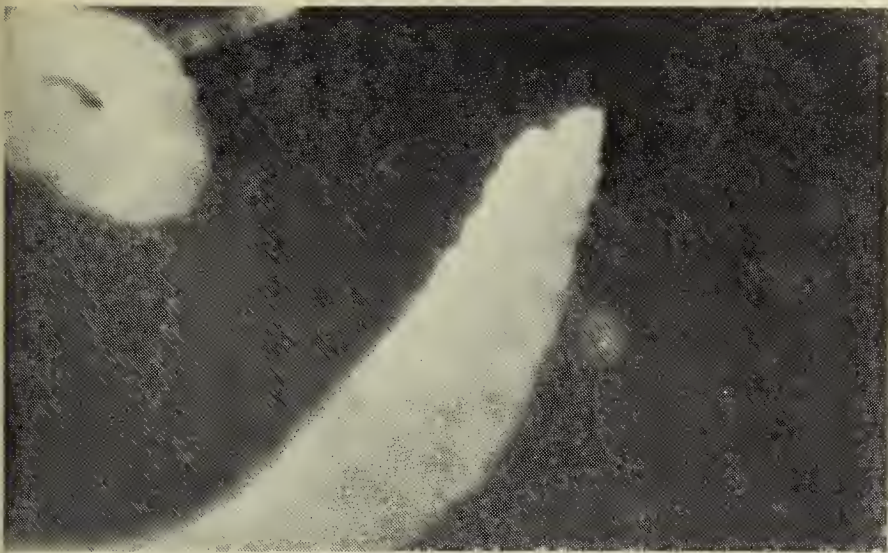
The water just off the floating mat contained the largest number of organisms, primarily because of the abundance of water fleas and copepods in the surface (limnetic) zone. One seven square inch stratum taken from this area contained one thousand individuals of *Daphnes pulex*. Samples taken from the floating mat were also quite well populated and contained somewhat more diverse fauna than the deeper water samples. The samples taken at the four foot depth contained considerable fewer organisms than the other samples.

Most of the abundant invertebrate taxa, were most frequently found in the vegetation of the floating mat. *Daphnia pulex* and the sideswimmers (*Hyalella azteca*) were most abundant just off the floating mat. The seeds were found to be the most abundant in the ooze of the deepest water samples.

The greatest numbers occurred at the second sampling time (in mid-June) once again due to the abundance of water fleas. The other organisms were most abundant at the end of June at the third sampling time.

There appears to be an abundance of aquatic invertebrates, especially *Daphnia* and *Hyalella*, and seeds present to serve as food for waterfowl in this lake. This is of interest because the lake is an important staging area for Lesser Scaup and Ring-necked ducks during spring and especially fall migration. Large numbers of these birds were observed feeding in the open water of the lake in late May. There were also a number of Mallards and Teal in and along the floating mat, which probably remained on the lake to nest.

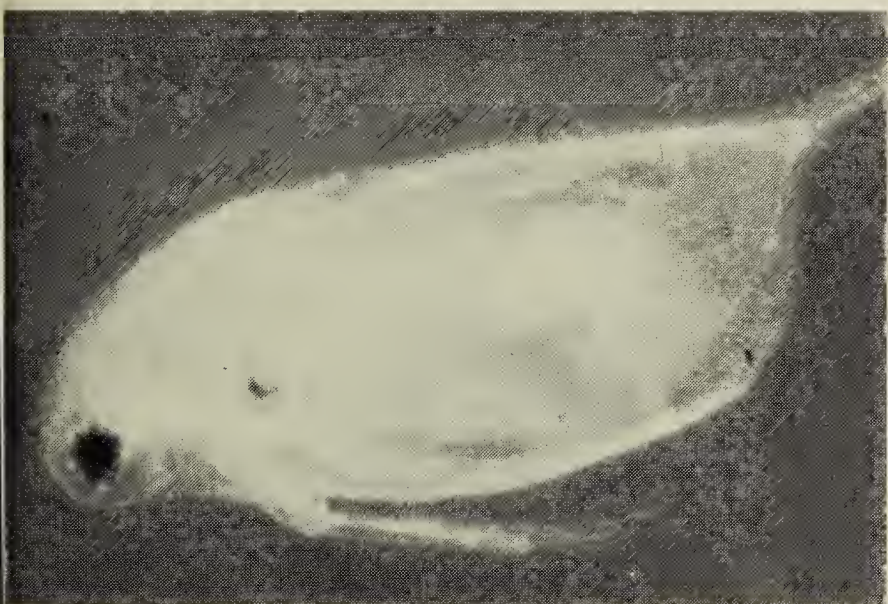




1a



1b



1c



1d



1e



1f





1g



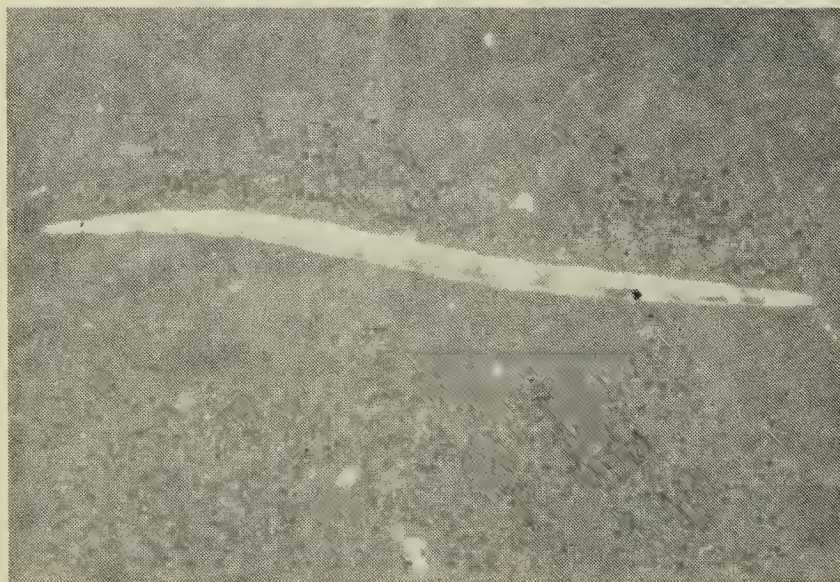
1h



1i



1j



1k



1l



TABLE 1: Invertebrate fauna observed in Potato Lake near La Ronge, Saskatchewan  
Gordiida (horsehair worms) *Gordius*

- Oligochaeta (aquatic earthworm): Naididae: *Chaetogaster*, *Nais*, *Styleria*  
Tufificidae: *Tubifex tubifex* (figure 1 a)  
Lumbriculidae: *Lumbriculus*
- Hirudinea (leeches): Glossiphoniidae: *Helobdella stagnolis* (figure 1b)  
Erpobdellidae: *Erpobdella punctata*, *Nephelopsis obscura*
- Crustacea: Cladocera: *Daphnia pulex* (figure 1c) *Daphnia similis*, *Eurycercus*,  
*Polyphemus* (figure 1d)  
Copepoda: *Calanoida*, *Cyclopoida* (figure 1e)  
Ostracoda: (seed shrimp) (figure 1f)  
Amphipoda: *Hyalella azteca* (sideswimmers) (figure 1g)
- Insecta: Ephemeroptera (mayflies): Caenidae: *Caenis* (figure 1h)  
Ephemerellidae: *Ephemerella*  
Siphonuridae: *Siphonurus*, *Ameletus*
- Odonata: Aeshnidae (dragon flies): *Aeshna*  
Libellulidae (dragon flies): *Libellula*, *Leucorrhinia*, *Tetragoneuria*  
Lestidae (damselflies): *Lestes*  
Coenagrionidae (damselflies): *Enallagma*, *Ishnura*
- Hemiptera: Corixidae: *Trichocorixa* (water boatmen)  
Notonectidae: *Notonecta* (back swimmers)  
Gerridae: *Gerris* (water striders)
- Trichoptera (caddisflies): Psychomyiidae: *Polycentropus*  
Phryganeidae: *Banksiola*  
Leptoceridae: *Oecetis*
- Coleoptera: Dytiscidae: *Hydroporus*, *Rhantus*, *Dytiscus* (predaceous diving beetles)  
Chrysomelidae: *Donacia* (leaf beetles) (figure 1i)
- Diptera: Tipulidae: *Hexatoma*, *Limnophila* (crane flies)  
Dixidae: *Dixa* (dixa midges)  
Culicidae: *Aedes* (mosquitoes) (figure 1j)  
Chironomidae: *Ablabesmyia*, *Chironomus*, *Polypedilum*, *Procladius* (midges)  
Heleidae: *Alluaudomyia*, *Bezzia* (figure 1k), *Atrichopogon* (biting midges)  
Muscidae: *Anthomyia* (true flies)
- Collembola: *Isotomurus* (springtails)
- Hydracarina (water mites)
- Archinae (spiders)
- Gastropoda (snails): Lymnaeidae: *Lymnaea*  
Amnicolidae: *Amnicola*  
Valvatidae: *Valvata*  
Planorbidae: *Gyraulus*, *Promenetus*  
Ancyliidae: *Ferrissia* (freshwater limpets)
- Pelecypoda: Sphaeriidae: *Sphaerium*, *Pisidium* (fingernail clams) (figure 1l)

Many of our northern waters produce interesting aquatic life than is usually thought. Many of the taxa are especially interesting since they are not found further south. Specimens such as these can be easily collected by amateur entomologists who are interested in Northern Saskatchewan, using a sweep net. Basic identification can be performed

using a good hand lens and a general key such as the one by Pennak.

Mr. Cliff Adams, University of Alberta, is gratefully acknowledged for the photography.

PENNAK, R. W. 1953. Freshwater Invertebrates of the United States. The Ronald Press Co., New York.



# A REVIEW OF SASKATCHEWAN CHRISTMAS BIRD COUNTS: 1942-1976 (PART I)

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This is the first of a two-part review that deals comprehensively with the large volume of information that has been collected during 35 years of Christmas Bird Counts since 1942 in Saskatchewan. Part I summarizes information about each of the 127 species that has been recorded during these counts.\* Part II, which will appear in a future issue of the *Blue Jay* will discuss (1) the frequency and abundance of species within groups (waterfowl, raptors, etc.), (2) aspects of early winter species diversity, and (3) population changes that have occurred over the 35-year period.

In 1942, the Saskatchewan Christmas Bird Count became the first organized field activity of the newly-formed Saskatchewan Natural History Society. Prior to this time, published Christmas bird counts in the province had consisted of 14 reports (nine of which were from Eastend) between 1913 and 1941.<sup>4</sup> Since 1942, these bird counts have generally followed the procedures developed by the National Audubon Society; however, for various reasons (the most important of which was likely the opportunity to publish the counts provincially) few counts were published in *Audubon Field Notes* or *American Birds*. Counts published in the *Blue Jay* from 1943 to 1977 form the basis of this review.

With few exceptions, we have incorporated all the information presented in the 946 counts reviewed in this paper. Counts from near the Saskatchewan border at Swan River,

Manitoba, have been excluded. One other count at Webb in 1965 was rejected as it seemed likely that the single Western Meadowlark was reported to the editor as an incidental observation rather than an actual count. Responsibility for the accuracy of these records lies solely with the observers.

We have evaluated the status of each species recorded during the past 35 years of Saskatchewan Christmas Bird Counts by looking at five aspects of each species' occurrence: regularity, frequency, abundance, high counts (and area) and early winter distribution. Each species account presents the following information:

- 1) regularity (number of years recorded),
- 2) frequency (number of counts during which the species was recorded on count day or as an additional species),
- 3) abundance (total number of individuals recorded on count days),
- 4) high count (largest number of individuals reported, together with the locality and date, on count day or as an additional species during count period),
- 5) all observations of species recorded fewer than six times during count period,
- 6) northernmost or southernmost observations (if applicable); this information does not appear for species covered by distribution maps. Fig. 1 shows the locations of all localities mentioned in the text.

To provide an indication of relative status, the 60 most frequently recorded and the 60 most abundant species have been ranked in descending order of importance in the annotated

\*The annual summaries of Christmas Bird Counts have traditionally followed the 1957 A.O.U. Checklist and thus have recognized 129 species.<sup>1</sup>



Table 1. Thirty most frequently recorded and 30 most abundant species observed on Christmas Bird Counts in Saskatchewan, 1942 to 1976. See Table 2 for ranks beyond 30. (T=tied)

	Rank			Rank	
	Fre-quency <sup>1</sup>	Abun-dance <sup>2</sup>		Fre-quency <sup>1</sup>	Abun-dance <sup>2</sup>
Black-billed Magpie	1	6	Starling	19	15
House Sparrow	2	1	Northern Shrike	20	—
Black-capped Chickadee	3	11	Common Raven	21T	16
Snow Bunting	4	2	Ring-necked pheasant	21T	19
Sharp-tailed Grouse	5	10	Gray Jay	23	29
Common Redpoll	6	3	Golden Eagle	24	—
Downy Woodpecker	7	18	Mallard	25	7
Gray Partridge	8	8	Goshawk	26	—
Hairy Woodpecker	9	21	Short-eared Owl	27	—
Pine Grosbeak	10	12	Hoary Redpoll	28	25T
Bohemian Waxwing	11	4	White-breasted Nuthatch	29	—
Great Horned Owl	12	25T	Merlin	30	—
Ruffed Grouse	13	22	Canada Goose	—	9
Snowy Owl	14	27	Common Goldeneye	—	17
Rock Dove <sup>3</sup>	15	5	White-winged crossbill	—	23
Blue Jay	16	20	Cedar Waxwing	—	24
Evening Grosbeak	17	14	Red Crossbill	—	28
Horned Lark	18	13	Lapland Longspur	—	30

<sup>1</sup>Based on 921 counts; range from Black-billed Magpie (844 counts, rank = 1) to Merlin (82 counts, rank = 30).

<sup>2</sup>Based on 916 counts; range from House Sparrow (217,058 individuals, rank = 1) to Lapland Longspur (259 individuals, rank = 30).

<sup>3</sup>See Additional Notes at end of Annotated List.

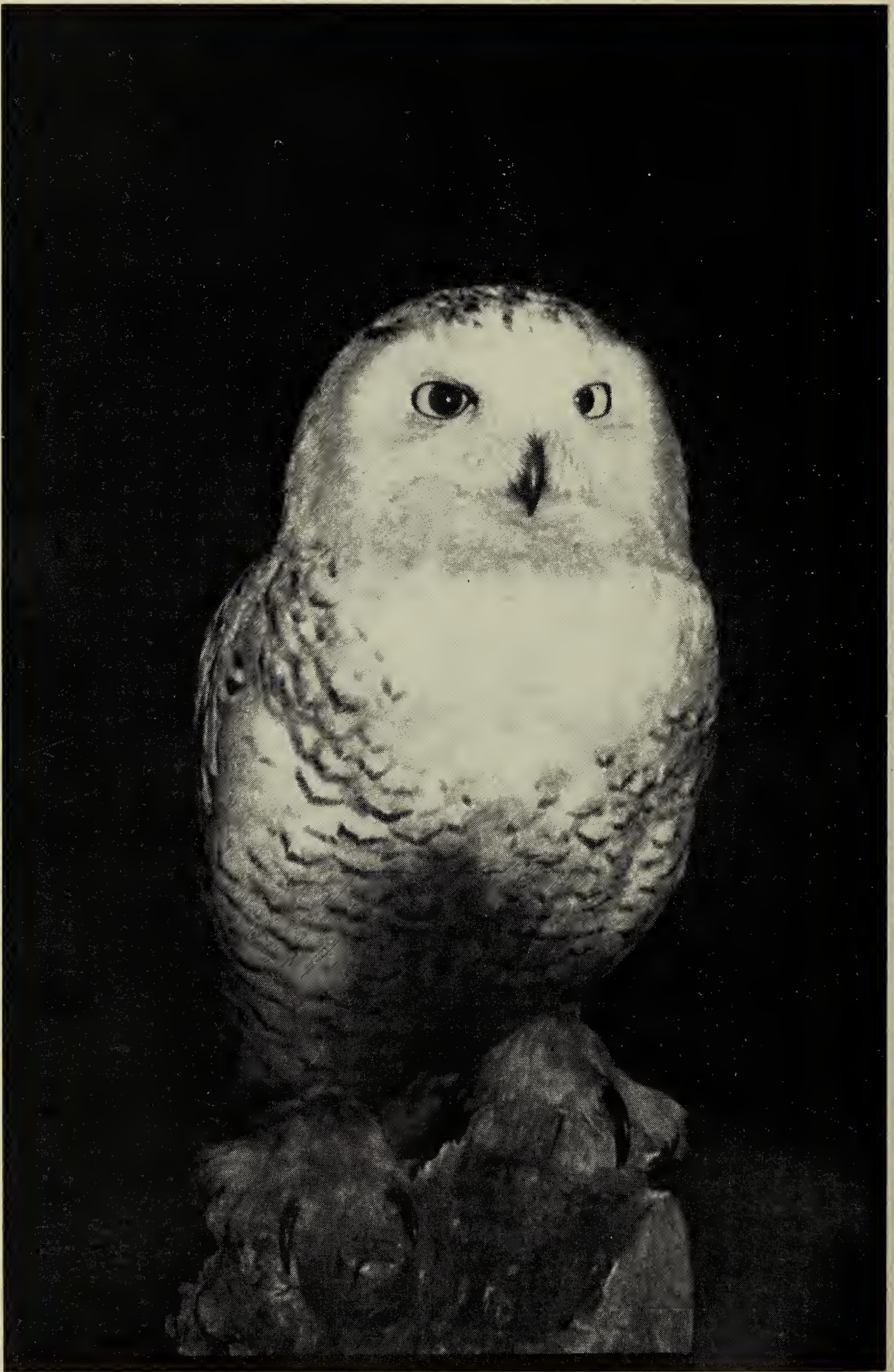
list of Table 2. The 30 most frequently recorded and 30 most common species are shown in Table 1. Where two or more species are tied for frequency or abundance, this is also indicated.

Both ranking procedures were used because a rank based on frequency often is not a reliable indication of a rank based on abundance. A major factor explaining this apparent anomaly is the species' social habits. A dispersed species, e.g., Hairy Woodpecker, usually has a frequency rank much higher than its abundance rank, and is typically recorded in small numbers on a large number of counts. Conversely, a highly gregarious species, e.g., Bohemian Waxwing, usually has a much higher abundance than frequency rank, and is recorded in large numbers on a relatively smaller number of counts. In fact, the Hairy Woodpecker was the 9th most frequently recorded but

only 21st most abundant species; the Bohemian Waxwing was the 11th most frequently recorded but 4th most abundant species. Clearly, both frequency and abundance must be considered in evaluating the status of a species.

Only counts completed within the official count period in each year have been included in the calculation of regularity, frequency, abundance, high counts and lists of all observations of rare species. Counts longer than a day, e.g., counts recording maximum numbers of each species observed during Christmas week, are excluded from data used to determine abundance. Where more than one count was submitted from one location in one year, the count with the highest species total on the day of the count was considered as count day. Species observed only on other counts completed at that location in that year were considered to be ad-





Snowy Owl

Wayne Gemmell



Table 2. Annotated List for Saskatchewan Christmas Bird Counts — 1942-1976

Species	Years	Counts	Rank	Birds	Rank	High Count, Location and Remarks (Unless otherwise noted, is month is December)
Red-neck Grebe	1	1	—	1	—	1 Regina 28/68
Horned Grebe	3	3	—	3	—	1 Regina 26/59 & 26/60 & 24/61
Eared Grebe	5	5	—	6	—	2 Regina 30/62. All Regina.
Western Grebe	2	2	—	2	—	1 Regina 26/56 & 26/69
Pied-bill Grebe	8	8	—	9	—	2 Regina 27/55 & 26/73. All Regina.
White Pelican	3	3	—	4	—	2 Regina 26/59; 1 on 26/67 & 26/69. (All)
Am Bittern	1	1	—	1	—	1 Yorkton 26/53. Injured.
Mute Swan	18	18	58 <sup>3</sup>	107	44	12 Regina 26/58. All Regina.
Whistling Swan	17	17	61 <sup>3</sup>	75	49	8 Regina Jan. 3/65. All Regina.
Trumpeter Swan	1	1	—	1	—	1 Regina Jan. 3/65.
Canada Goose	22	27	48 <sup>2</sup>	9427	9	1639 Regina 26/75. N to Kutawagan Lake. In Regina annually 1955-1976
White-fr Goose	1	1	—	1	—	1 Saskatoon 26/74
Snow Goose	1	1	—	1	—	1 Regina 26/74
Ross' Goose	2	2	—	2	—	1 Regina 30/62 & 26/74
*Mallard	29	110	25	12387	7	990 Regina 28/63
Black Duck	1	1	—	1	—	1 Regina 26/73
Gadwall	10	13	—	12	—	2 Regina 24/61 & Jan. 3/65 CP 2 Regina 24/63. N to Saskatoon
Pintail	18	23	54 <sup>2</sup>	36	59	3 Regina 26/56 & 27/55 & 26/60, Saskatoon 26/74. North to Saskatoon
Green-wgd Teal	3	3	—	2	—	2 Saskatoon 26/74; CP 1 Regina/55, /56 & (All)
Blue-wgd Teal	6	6	—	4	—	2 (1 inj) Regina 30/62. All Regina
Am Wigeon	8	11	—	17	—	7 Regina 28/63. N to Saskatoon
N Shoveler	4	4	—	5	—	2 Regina 26/75; 1 Regina 30/62, Saskatoon 26/67 & 26/74. All observations.
Redhead	11	14	—	31	—	8 Regina 26/69. N to Saskatoon
Canvasback	16	18	58 <sup>3</sup>	24	—	4 Regina 26/70. N to Saskatoon
Greater Scaup	1	1	—	1	—	1 Regina 26/74
*Lesser Scaup	21	39	40	211	34	15 Regina 27/71
*Com Goldeneye	24	69	33	1152	17	207 Saskatoon 26/76
Bufflehead	4	4	—	3	—	2 Regina 26/73, 1 Regina 26/69. CP 1 Reg/60 & /74. (All)
Oldsquaw	1	1	—	—	—	— CP 1 Ft. Qu'Appelle 21/68; collected, 1st Saskatchewan record.
Wh-wgd Scoter	1	1	—	2	—	2 Cold River 15/74
Ruddy Duck	15	15	—	42	56	7 Regina 30/62. All Regina
Hood Merganser	3	3	—	6	—	3 Estevan 30/60; 2 Gardiner Dam 20/72; 1 Reg 26/74. (All)
Com Merganser	12	18	58 <sup>3</sup>	29	—	7 Gardner Dam 30/76. N to Squaw Rapids and Cold River
Red-br Merganser	3	4	—	5	—	2 Regina 26/56 & Saskatoon 26/73; 1 Regina 26/69. CP 2 Ft. Qu'Appelle 24/69. (All)
*Goshawk	32	99	26	100	46	5 Yorkton 26/43 & Little Bear Lake 26/58
Sharp-sh Hawk	4	4	—	3	—	1 Carlton 30/56 & Moose Jaw 26/70 & Big Gully 18/74. CP 1 Nipawin-Squaw Rapids 26/69. (All)
Cooper's Hawk	1	1	—	—	—	— CP 1 Battleford 28/59
*Rough-leg Hawk	18	37	43	21	—	3 Val Marie 26/66
*Golden Eagle	33	136	24	120	43	5 Skull Creek 26/69
*Bald Eagle	16	26	50	56	54	19 Nipawin-Squaw Rapids 26/69
Marsh Hawk	7	7	—	4	—	1 per count. N to Harris, Kenaston, Hawarden.
Gyrfalcon	5	8	—	8	—	1 Gull Lake, Harris, Lady Lake, Last Mt. Lake, Reg, Saskatoon (2 yrs), White Bear per count. CP 2 Regina/60, Skull Creek/76 per count. N to Squaw Rapids-Carrot R.
*Prairie Falcon	22	43	39	24	—	1 Saskatoon 26/72 & 26/75
Peregrine Falcon	7	8	—	4	—	1 Lumsden 29/58 & Skull Creek 27/69.
*Merlin	25	82	30	84	47	6 CP 1 Spring Valley 17/72
Am Kestrel	3	3	—	2	—	2 Nipawin 31/48
*Spruce Grouse	12	13	—	38	57	29 Battleford 26/60
*Ruffed Grouse	35	329	13	712	22	17 Stony Rapids 31/71
*Willow Ptarmigan	10	14	—	76	48	32 Harris 17/72. See below.
*Sharp-t Grouse	35	568	5	9069	10	386 Shaunavon Jan. 1/62 & Masfield 27/62. N to Maple Creek
Sage Grouse	8	8	—	29	—	11 Woodrow 26/59
*Ring-nk Pheasant	31	165	21 <sup>2</sup>	1133	19	55 Lumsden 29/58; 7 Battleford 29/47.
Chukar	2	2	—	37	58	30 (All). See below.
*Gray Partridge	35	483	8	10795	8	532 Saskatoon 26/70

\*See Distribution map.

<sup>2</sup>Two-way tie.

<sup>3</sup>Three-way tie.



Species	Years	Counts	Rank	Birds	Rank	High count, Location and Remarks (Unless otherwise noted, month is December)
Am Coot	22	24	54 <sup>2</sup>	71	51	11 Regina 28/63. All Regina except 2 at Gardiner Dam & Ft. Qu'Appelle
Glaucous Gull	2	2	—	4	—	3 Gardiner Dam 22/75 & 1 on 30/76 (All)
Herring Gull	1	1	—	—	—	CP 1 Regina 30/56
Ring-bill Gull	2	2	—	1	—	1 Saskatoon 26/58. CP 1 Regina 23/69 (All)
Rock Dove	19	309	15	21462	5	1846 Saskatoon 27/71. See below
*Mourning Dove	8	12	—	10	—	3 Round Lake 28/75
*Great Horn Owl	35	364	12	555	25 <sup>2</sup>	11 Harris 19/71
*Snowy Owl	35	325	14	521	27	15 Regina 26/75
*Hawk Owl	15	17	61 <sup>3</sup>	12	—	2 Masefield 30/60. CP Nipawin 31/56; Radisson 20/69
Barred Owl	3	4	—	1	—	1 Klogei Lake-High Hill 27/59. CP 1 Radisson 20, 27/68 & Regina 23/69 & 31/72
Great Gray Owl	4	7	—	6	—	2 Nipawin 29/73. 1 Carrot River, Cowan L — Cowan R, Nipawin (twice), Nipawin-Squaw Rapids, Pas Trail, Saltcoats
*Long-eared Owl	12	12	—	8	—	2 Shaunavon 23/60. CP 3 Masefield 23/62
*Short-eared Owl	27	92	27	191	38	23 Regina 26/69
Boreal Owl	8	9	—	6	—	1 per count. South to Dilke, N to Nipawin
*Saw-whet Owl	9	12	—	5	—	1 per count.
*Common Flicker	19	39	41	55	55	6 Regina 26/67. Only "Red-Shafted" was at Regina 26/70
*Pil Woodpecker	31	52	37	35	60 <sup>2</sup>	2 Nipawin 26/42 & Wallwort Jan. 1/45 & Somme 26/53 & Big River 30/55. CP 2 Nipawin/52 & Big River 26/58 & 30/59
*Hairy Woodpecker	35	439	9	874	21	13 Saskatoon 26/72
*Downy Woodpecker	35	503	7	1146	18	23 Saskatoon 26/73 & 26/76
*B-b 3-t Woodpeck	16	19	56	17	—	3 Somme 27/52
*N 3-t Woodpecker	17	25	51	35	60 <sup>2</sup>	7 Somme 27/52
*Horned Lark	32	227	18	5688	13	519 Moose Jaw 26/68
*Gray Jay	35	162	23	448	29	67 Besnard Lake 27/74
*Blue Jay	35	259	16	874	20	25 Saskatoon 26/70
*Bl-bill Magpie	35	844	1	17007	6	381 Saskatoon 26/74
*Common Raven	33	166	21 <sup>2</sup>	1548	16	195 Besnard Lake 27/74
*Common Crow	19	30	45	66	52	33 Prince Albert 27/57 (9 ravens also); 5 Moose Jaw 26/62
*Bl-cap Chickadee	35	695	3	8524	11	218 Saskatoon 26/73
Mount Chickadee	1	1	—	1	—	1 Piapot 28/66
*Boreal Chickadee	31	70	32	253	31	31 Besnard Lake 27/74
*Wh-br Nuthatch	30	83	29	124	42	4 Wallwort Jan. 1/45 & Somme 27/52 & Big River 31/52 & Moose Jaw 26/62 & Spirit Lake 29/63
*Red-br Nuthatch	25	53	36	217	32	60 Fort Walsh 31/76
*Brown Creeper	15	23	54 <sup>2</sup>	29	—	5 Fort Walsh 31/76
North Mockingbird	1	1	—	1	—	1 Regina 26/67
Brown Thrasher	2	2	—	1	—	1 Saskatoon 26/60. CP 1 Regina 21/68
*Am Robin	27	73	31	194	36	44 Saskatoon 26/70
Mount Bluebird	1	1	—	—	—	CP 1 Ft. Qu'Appelle 26/73
Town Solitaire	5	6	—	6	—	1 Regina (4 yrs.), Moose Jaw, Ft. Walsh
*Gold-cr Kinglet	13	28	47	213	33	45 Big Gully Creek 19/74
Ruby-cr Kinglet	1	1	—	1	—	1 Biggar 16/72
*Bohemian Waxwing	34	422	11	68329	4	12442 Saskatoon 26/75
*Cedar Waxwing	21	38	42	582	24	90 Saskatoon 26/75
*Northern Shrike	33	172	20	153	39	6 Saskatoon 26/63 & Pike Lake 28/69
*Starling	32	208	19	2524	15	124 Moose Jaw 26/68
Yel-rump Warbler	1	1	—	1	—	1 Saskatoon 28/54. (Myrtle)
*House Sparrow	35	781	2	217058	1	4333 Saskatoon 26/70
*West Meadowlark	11	17	61 <sup>3</sup>	12	—	3 Skull Creek 26/71
*Red-wg Blackbird	14	24	52 <sup>2</sup>	71	50	30 Estevan 27/62
*Rusty Blackbird	17	56	34	206	35	38 Regina 26/73
*Brewer Blackbird	20	27	48 <sup>2</sup>	58	53	23 Wolseley 31/63
*Common Grackle	12	14	—	13	—	3 Regina 26/67
Brown-h Cowbird	1	1	—	—	—	CP 11 Masefield Jan. 2/60
Cardinal	1	1	—	1	—	1 Craven 29/60. Collected, 1st Sask. specimen record
*Evening Grosbeak	34	255	17	3725	14	202 Nipawin 26/72
Purple Finch	8	9	—	26	—	14 Saskatoon 26/69. N to Saskatoon
*Pine Grosbeak	35	437	10	7550	12	422 Saskatoon 26/69
Gray-c Rosy Finch	4	4	—	140	40	140 Ft. Walsh 31/76. CP 25 Dollard/45, 3 Dollard/46, 1 Spring Valley 30/75. (All)
*Hoary Redpoll	25	89	28	555	25 <sup>2</sup>	62 Cumberland House 31/69
*Common Redpoll	35	541	6	72785	3	3651 Nipawin 26/52
*Pine Siskin	8	14	—	193	37	50 Moose Jaw 26/72
*Red Crossbill	15	29	46	471	28	235 Nipawin 31/48
*Wh-wgd Crossbill	21	51	38	702	23	230 Emma Lake 30/75
Ruf-side Towhee	1	1	—	1	—	1 Moose Jaw 26/63
Vesper Sparrow	1	1	—	1	—	1 Saltcoats 27/52. Injured wing.



Species	Years	Counts	Rank	Birds	Rank	High Count, Location and Remarks (Unless otherwise noted, month is December)
*Dark-eyed Junco	24	54	35	127	41	50 Yorkton 26/53. Only 3 "Oregon" records: 2 Saskatoon 26/58, CP 1 Moose Jaw 23/63, CP 1 Ft. Qu'Appelle Jan. 1/64
*Tree Sparrow	24	32	44	103	45	28 Skull Creek 30/56
Harris Sparrow	7	9	—	7	—	1 per count. N to Nipawin
Wh-cr Sparrow	1	1	—	1	—	1 Saskatoon 26/74
Wh-thr Sparrow	6	6	—	5	—	1 per count. N to Nipawin
Fox Sparrow	1	1	—	—	—	1 CP 1 Val Marie 22/67
*Song Sparrow	8	10	—	9	—	1 per count
*Lapland Longspur	9	13	—	259	30	200 Caron 27/71
*Snow Bunting	35	655	4	133058	2	11561 Nipawin 26/52

ditional species, i.e., species observed during count period but not on count day. Counts with slightly different count names such as Nipawin — Squaw Rapids and Nipawin — White Gull Creek were maintained as separate counts.

Distribution maps are included for 63 of 75 species recorded more than nine times during the 35-year period. The Rock Dove was not mapped because it was not counted prior to 1958. Eleven species of waterfowl were excluded because they were very locally distributed. All localities are given for species recorded fewer than six times. Northernmost or southernmost localities are provided for species noted six to nine times and for species recorded more than nine times but for which accompanying distribution maps are not included.

The information used to draw the distribution maps followed the same general criteria as those used to determine frequency except that counts completed in Saskatchewan outside the official count period were also used. It was felt that these counts provided significant additional information on early winter distribution of several species.

A total of 946 counts was reviewed for this summary; 945 were published in the *Blue Jay* and the other (from Black Lake in 1972) was published in *American Birds*. A total of 920 counts was used to evaluate regularity and frequency and to establish high counts for common species and lists of all observations for rare species;

916 counts were used to establish abundance; and distribution maps are based on 933 counts.

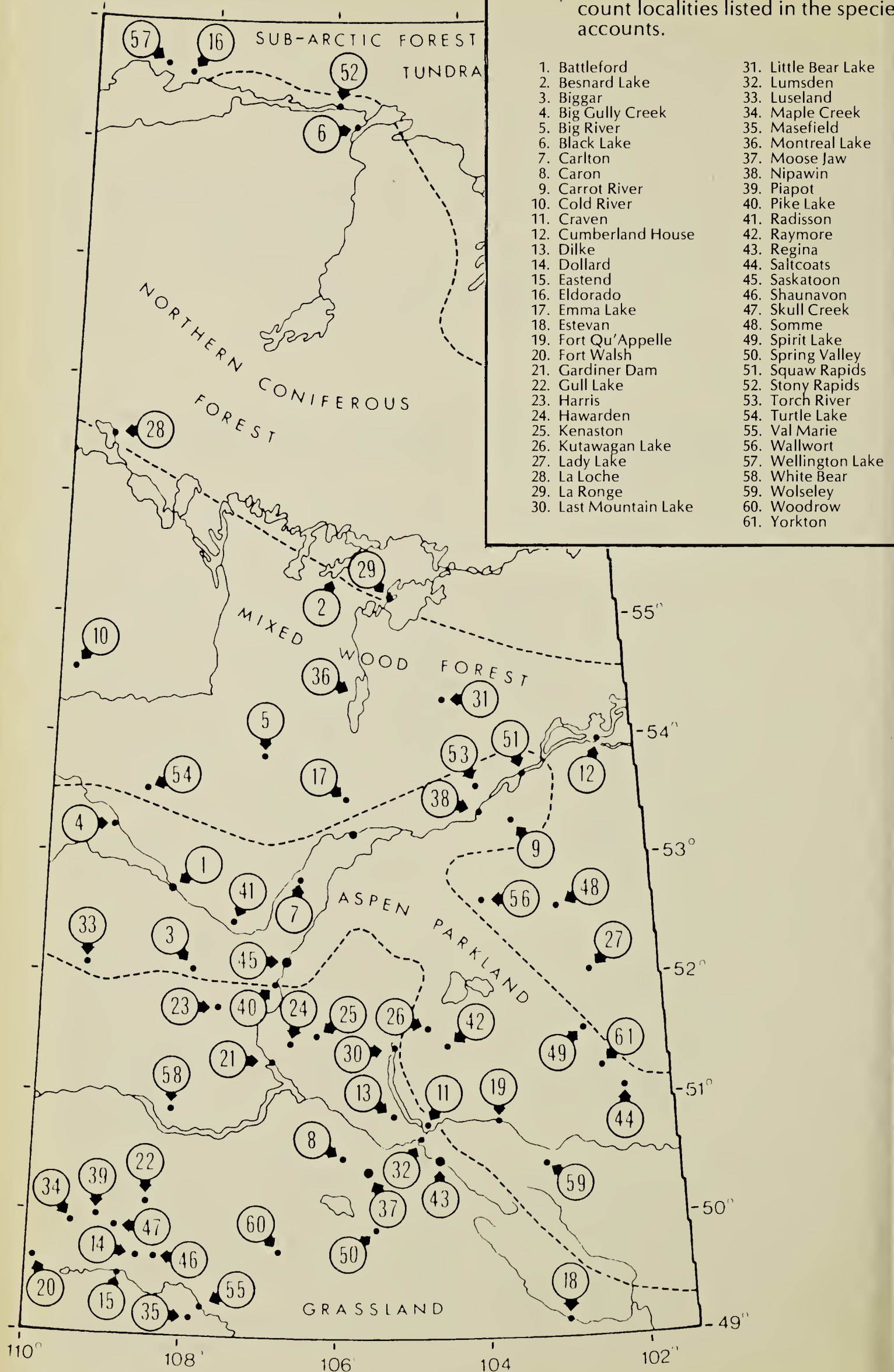
Information on the number of hours spent counting and miles travelled was often not provided; therefore, analysis by party-hours (the procedure used in *American Birds* to map distribution) or party-miles could not be used here. The small number of observers participating in most counts often resulted in a small number of species on count day and a relatively large number during count period when additional species are included. We felt that, for mapping purposes, the most accurate indication of a species' frequency in an area was its presence during the count period (i.e., either on count day or as an additional species).

The distribution maps show the frequency of occurrence of each species in blocks that are two degrees longitude by one degree latitude; these areas, referred to here as degree blocks, are based on the 1:250,000 scale maps published by the Surveys and Mapping Branch, Department of Energy Mines and Resources. The total number of counts in each degree block is presented on the first distribution map. The percent of counts on which a species was recorded (during count period) is presented diagrammatically in the circle contained in each degree block.

To provide more accurate range information for the earlier years, the



Fig. 1. Vegetation zones<sup>5</sup> and locations of count localities listed in the species accounts.

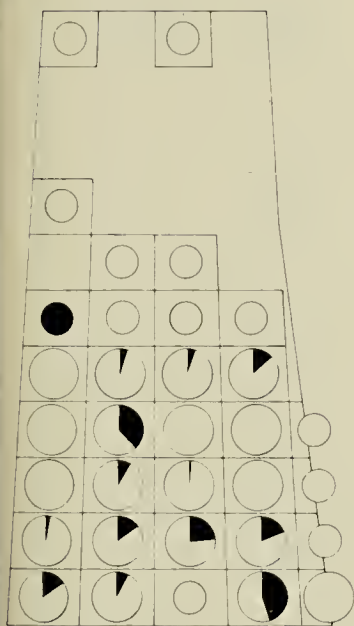
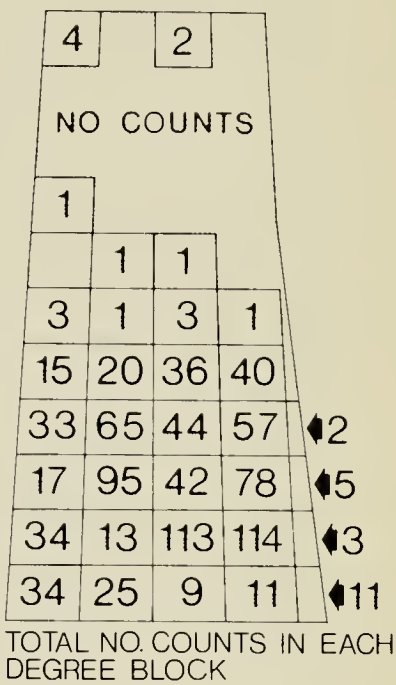




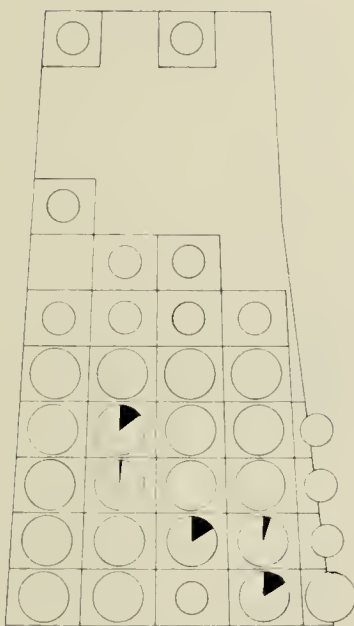
# DISTRIBUTION MAPS

SHADED PART OF EACH CIRCLE REPRESENTS PER CENT OF COUNTS ON WHICH THE SPECIES WAS RECORDED DURING COUNT PERIOD, 1942 TO 1976.

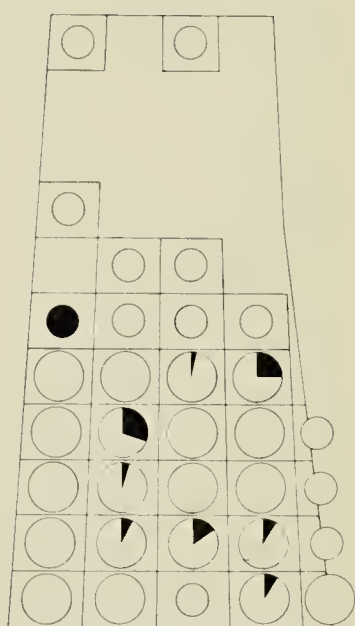
(CIRCLES ARE SMALLER IN DEGREE BLOCKS WITH FEWER THAN 10 COUNTS)



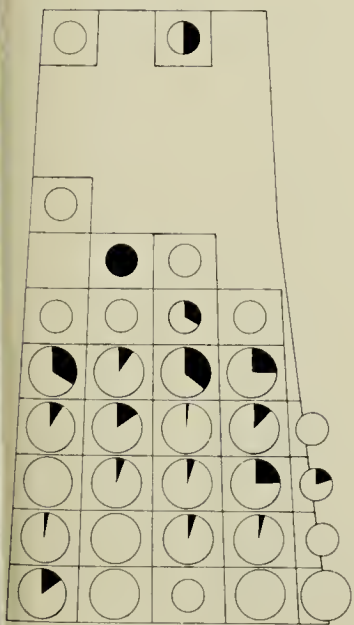
MALLARD



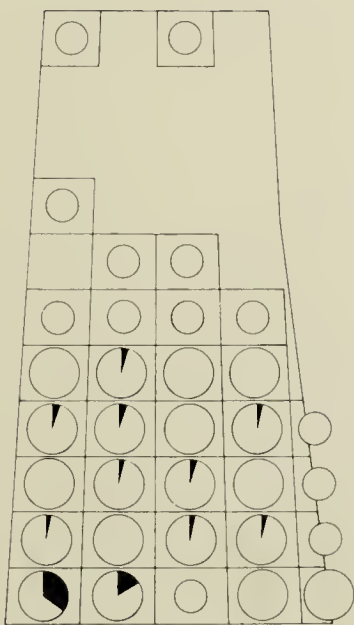
LESSER SCAUP



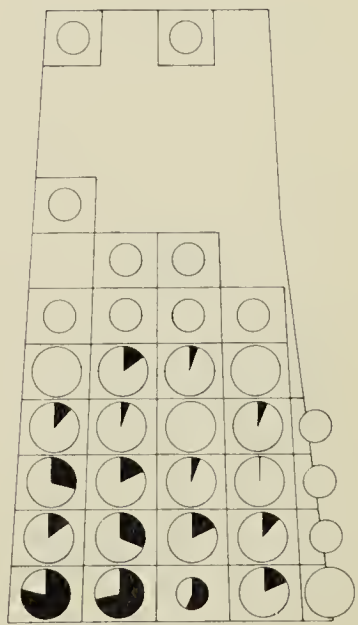
COMMON GOLDENEYE



GOSHAWK



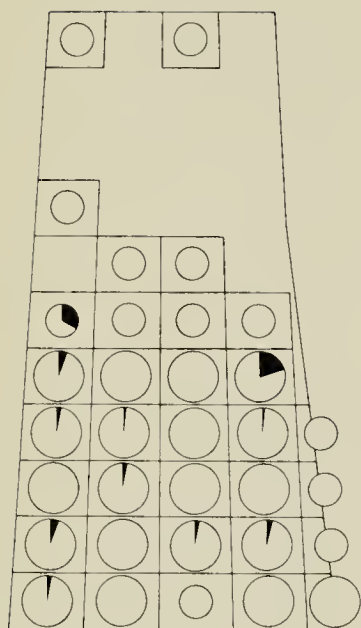
ROUGH-LEGGED HAWK



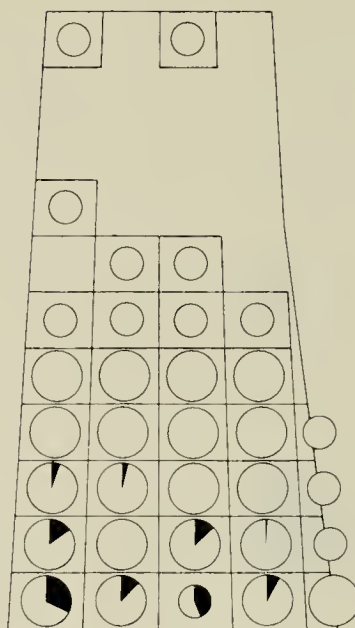
GOLDEN EAGLE



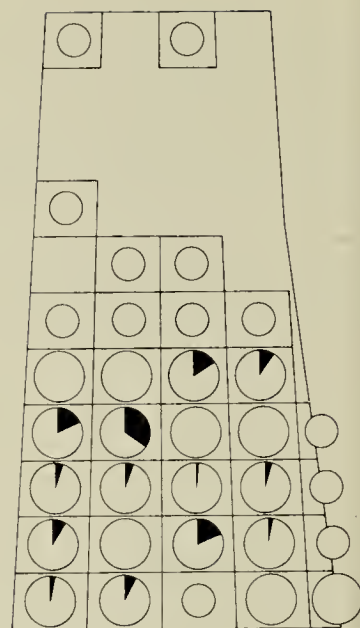
## DISTRIBUTION MAPS



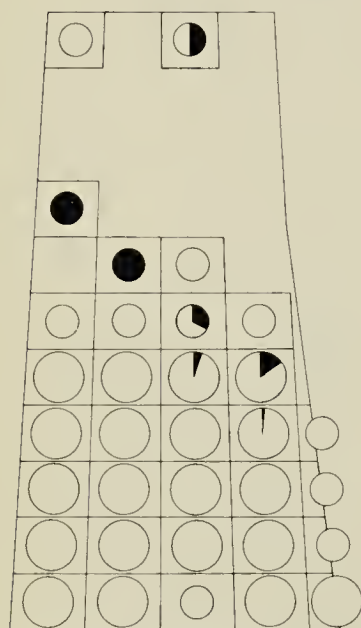
BALD EAGLE



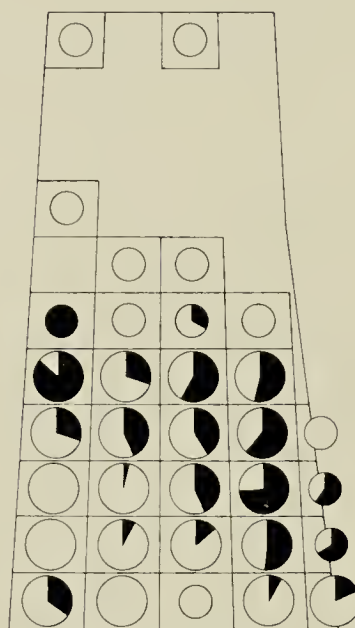
PRAIRIE FALCON



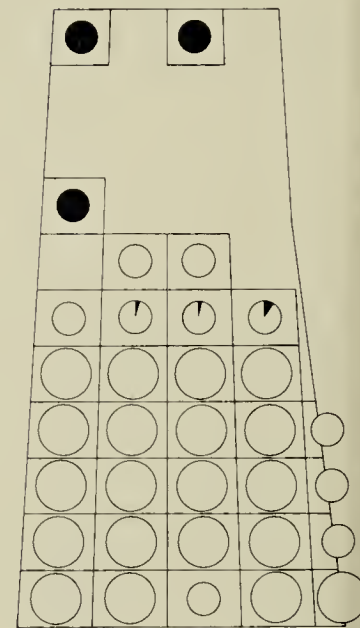
MERLIN



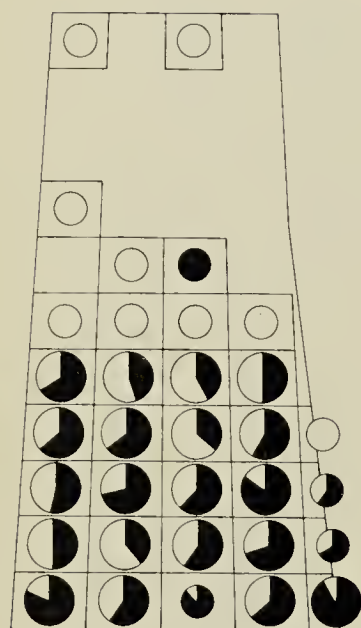
SPRUCE GROUSE



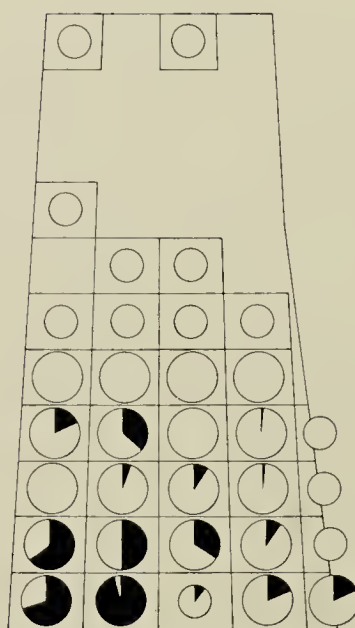
RUFFED GROUSE



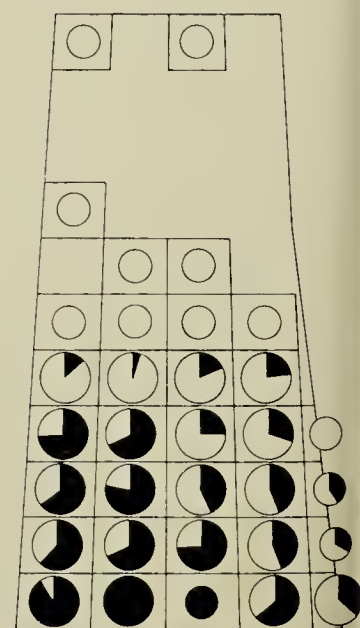
WILLOW PTARMIGAN



SHARP-TAILED GROUSE



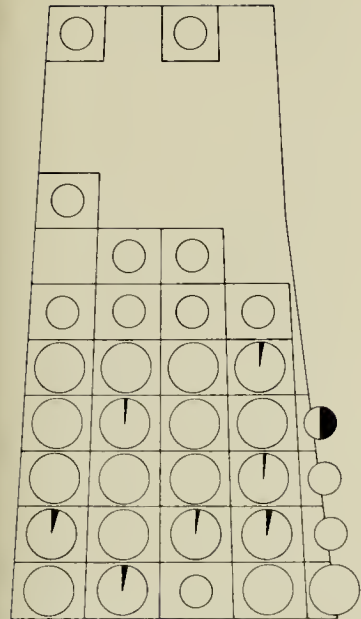
RING-NECKED PHEASANT



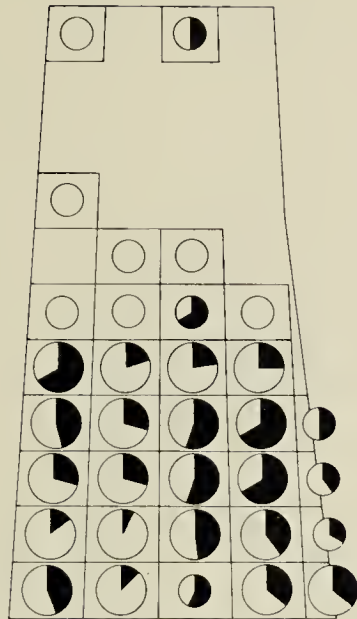
GRAY PARTRIDGE



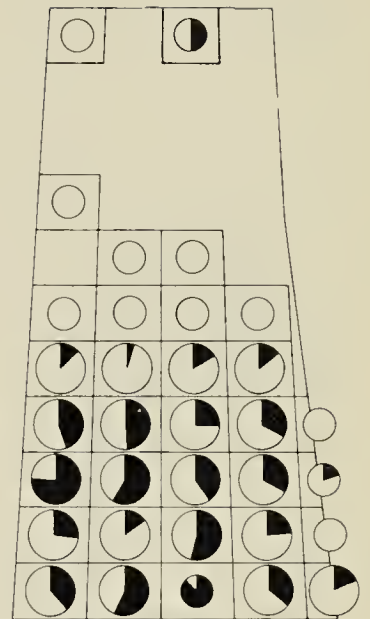
# DISTRIBUTION MAPS



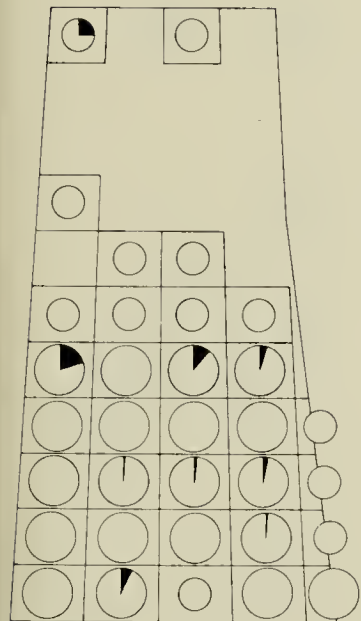
MOURNING DOVE



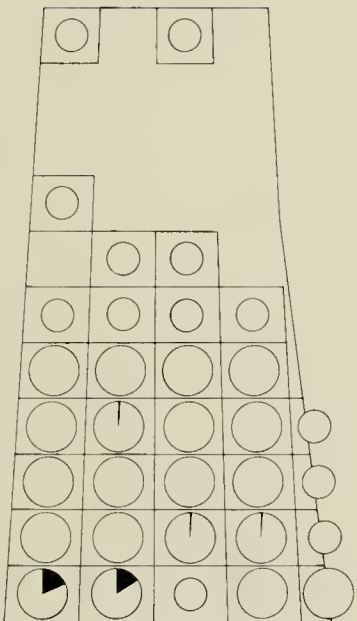
GREAT HORNED OWL



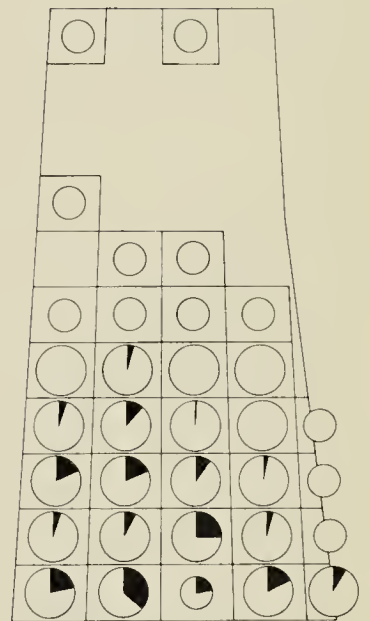
SNOWY OWL



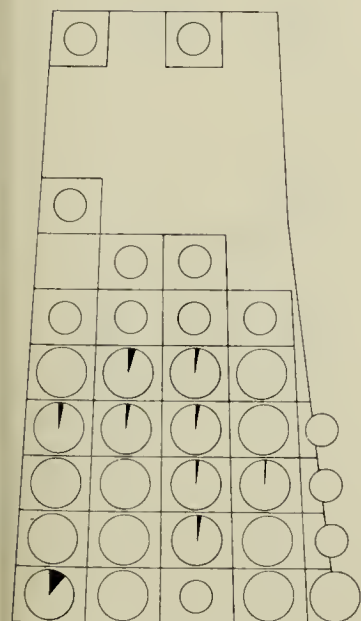
HAWK OWL



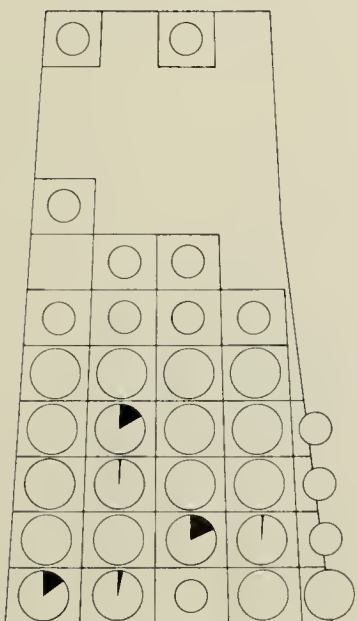
LONG-EARED OWL



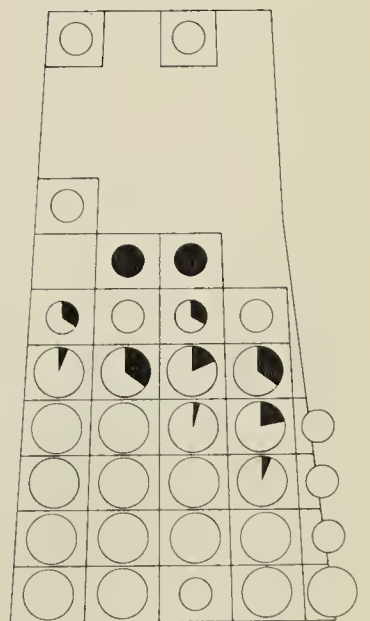
SHORT-EARED OWL



SAW-WHET OWL



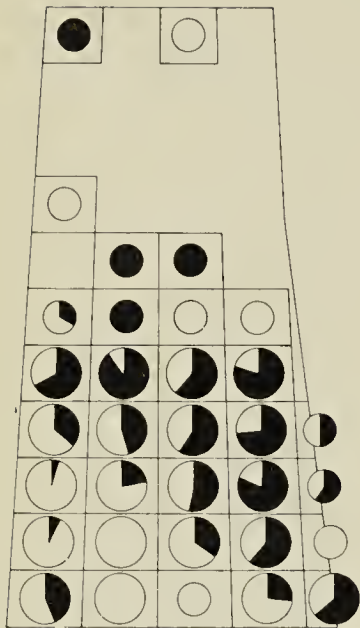
COMMON FLICKER



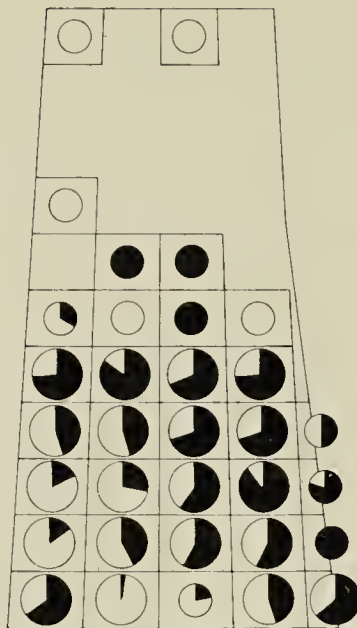
PILEATED WOODPECKER



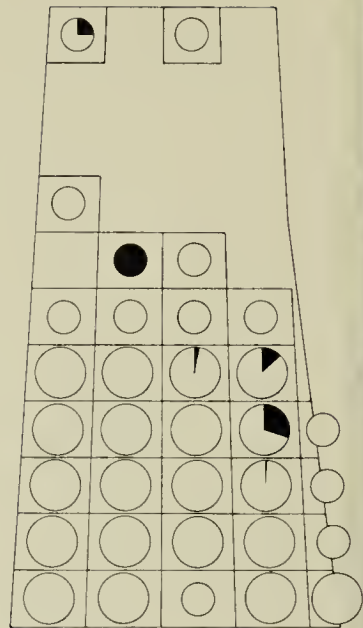
# DISTRIBUTION MAPS



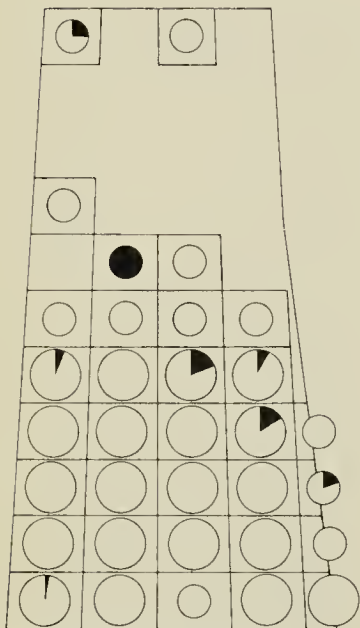
HAIRY WOODPECKER



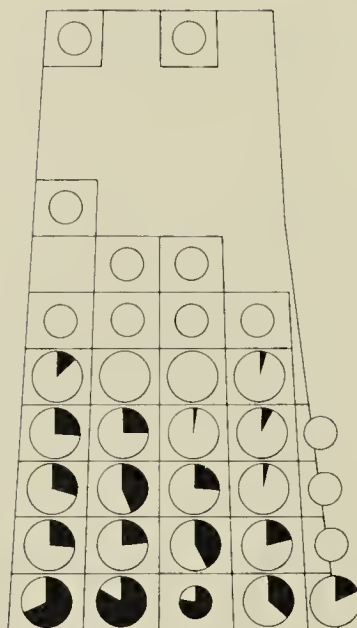
DOWNY WOODPECKER



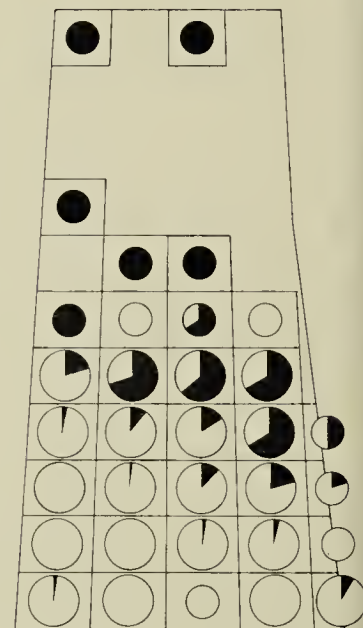
BLACK-BACKED 3-TOED WOODPECKER



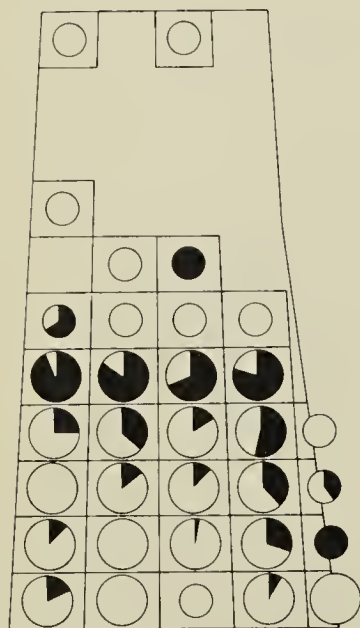
NORTHERN 3-TOED WOODPECKER



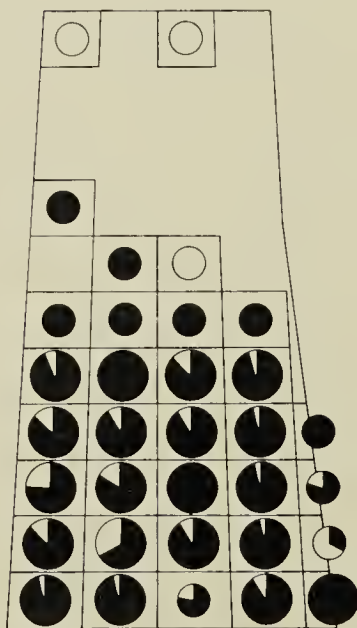
HORNED LARK



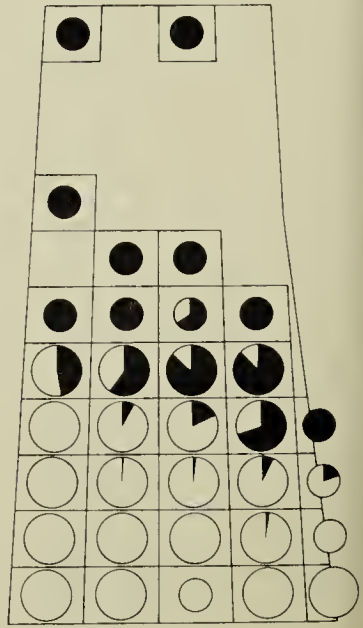
GRAY JAY



BLUE JAY



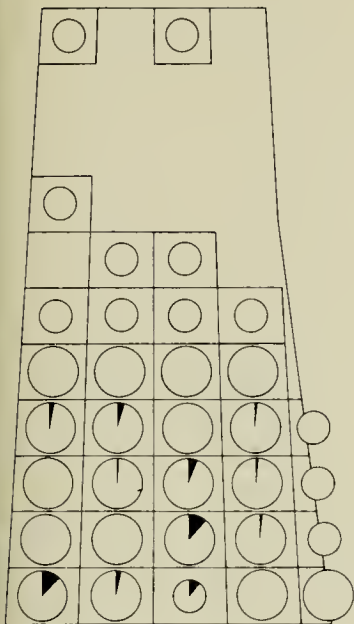
BLACK-BILLED MAGPIE



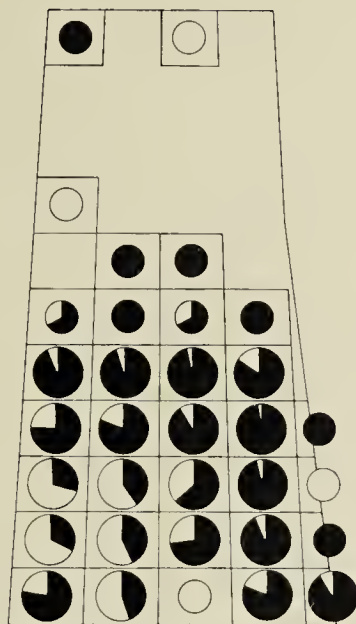
COMMON RAVEN



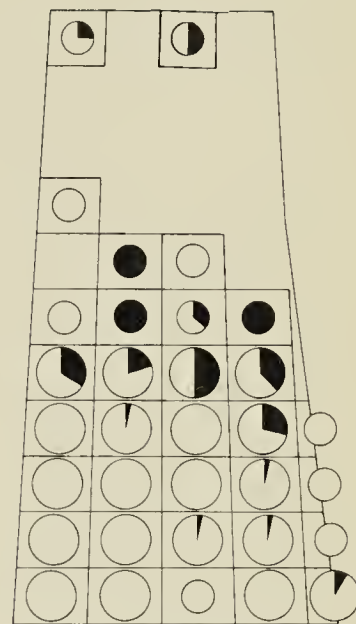
# DISTRIBUTION MAPS



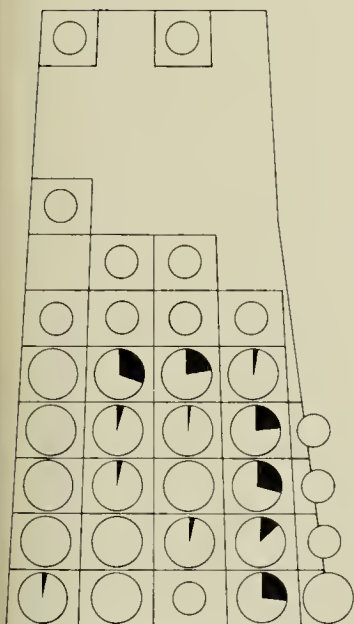
COMMON CROW



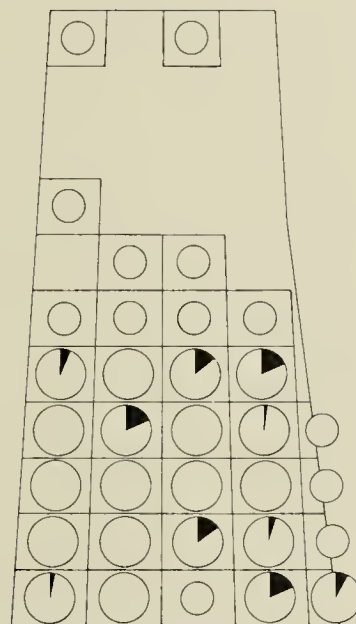
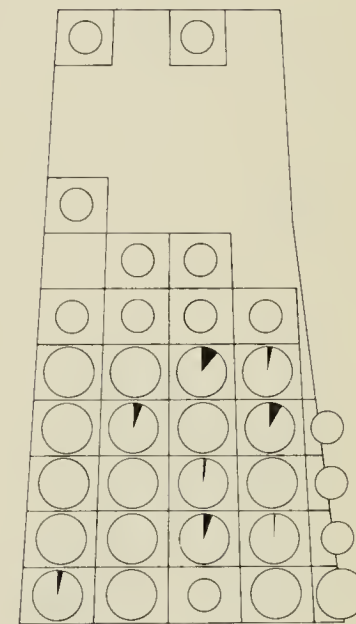
BLACK-CAPPED  
CHICKADEE



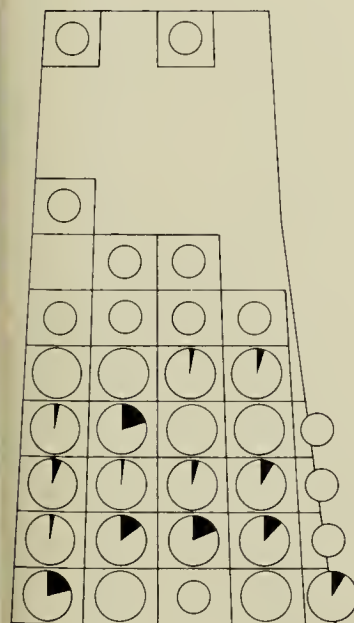
BOREAL CHICKADEE



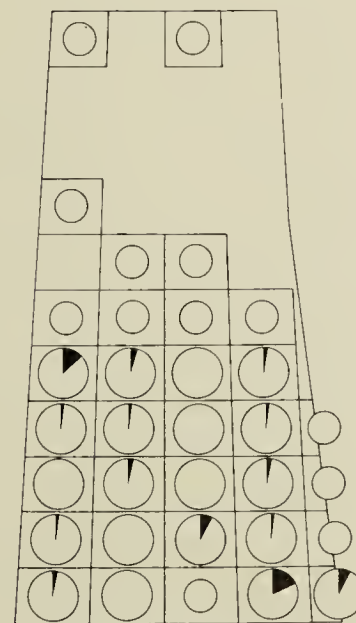
WHITE-BREASTED  
NUTHATCH

RED-BREASTED  
NUTHATCH

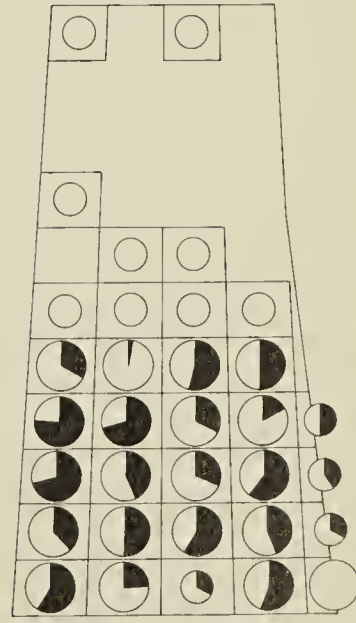
BROWN CREEPER



AMERICAN ROBIN



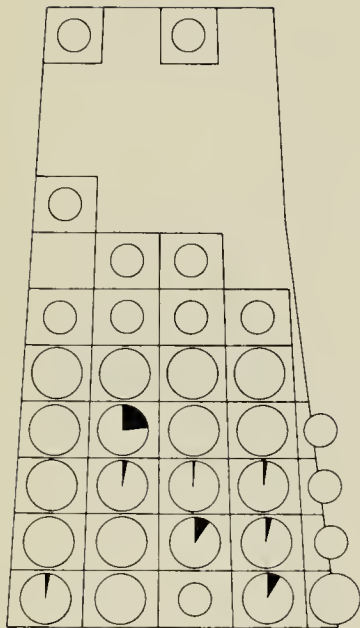
### GOLDEN-CROWNED KINGLET



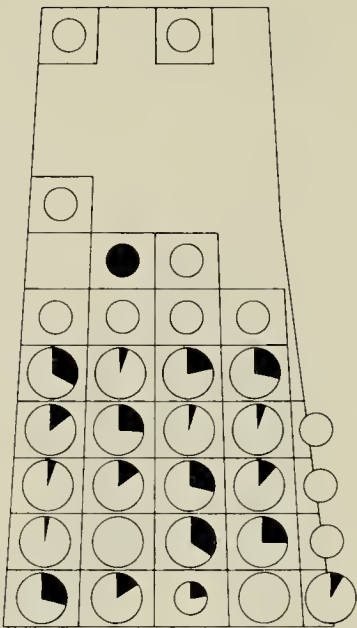
BOHEMIAN WAXWING



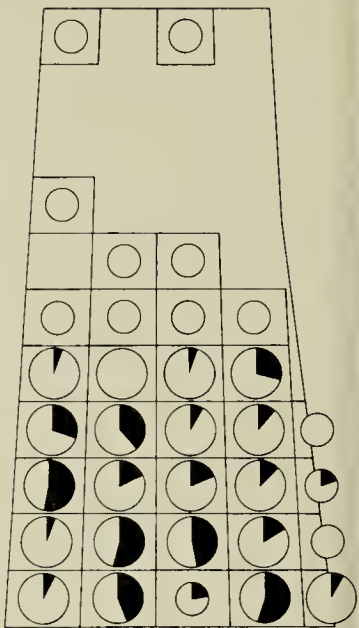
DISTRIBUTION MAPS



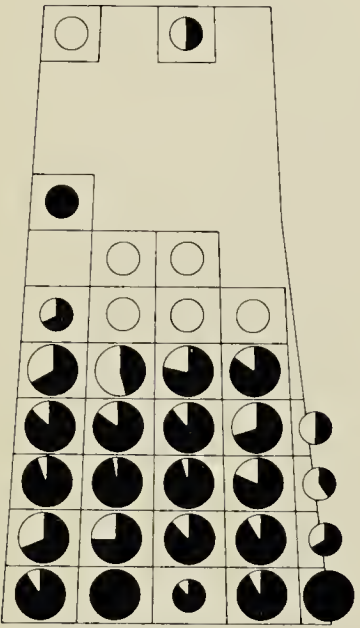
CEDAR WAXWING



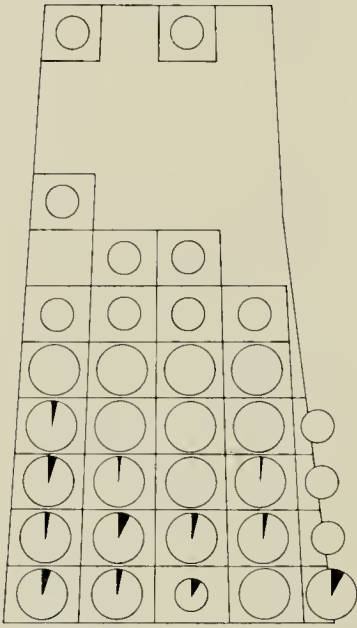
NORTHERN SHRIKE



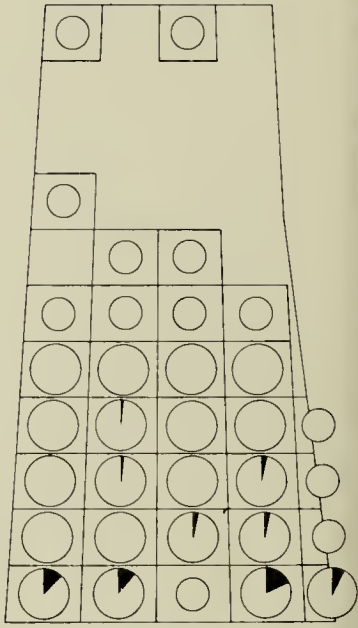
STARLING



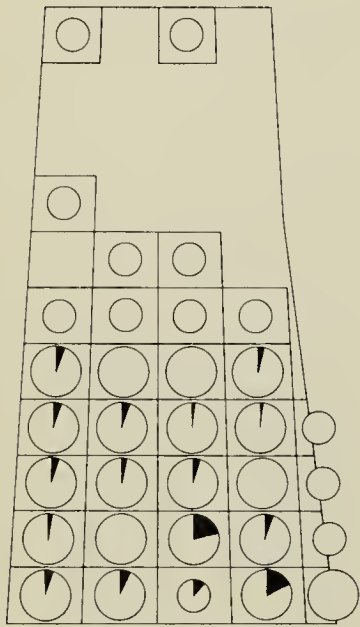
HOUSE SPARROW



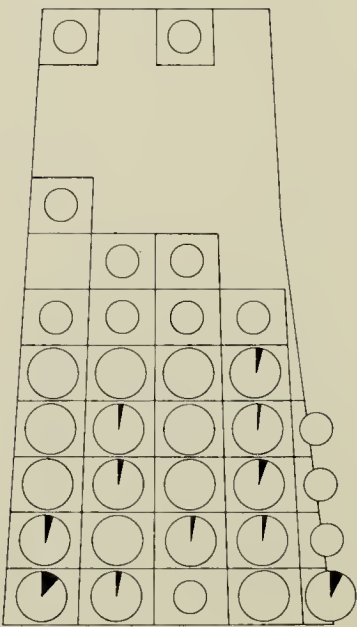
WESTERN MEADOWLARK



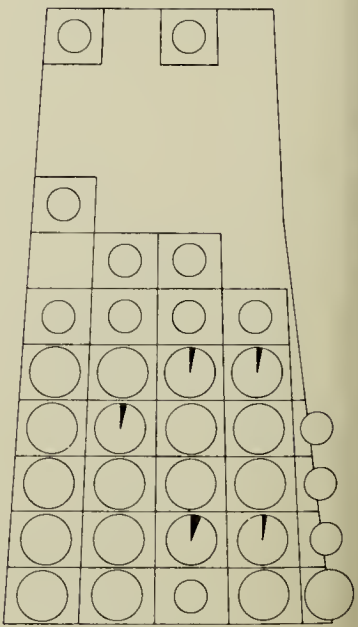
RED-WINGED BLACKBIRD



RUSTY BLACKBIRD



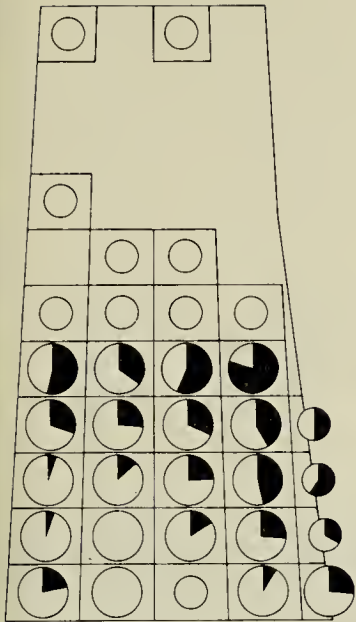
BREWER'S BLACKBIRD



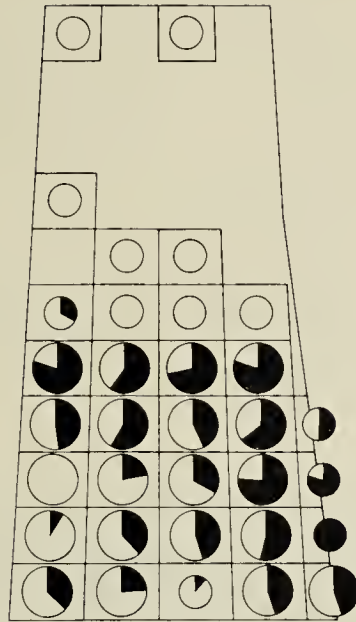
COMMON GRACKLE



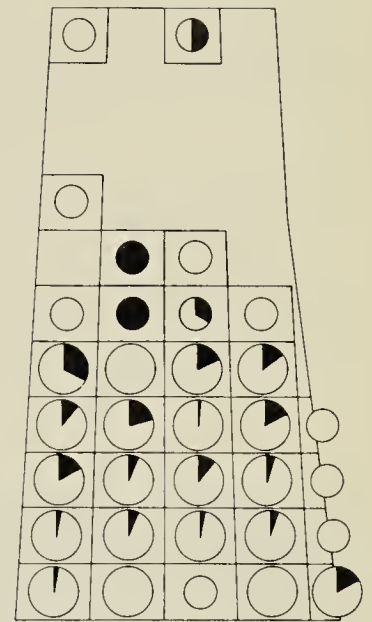
# DISTRIBUTION MAPS



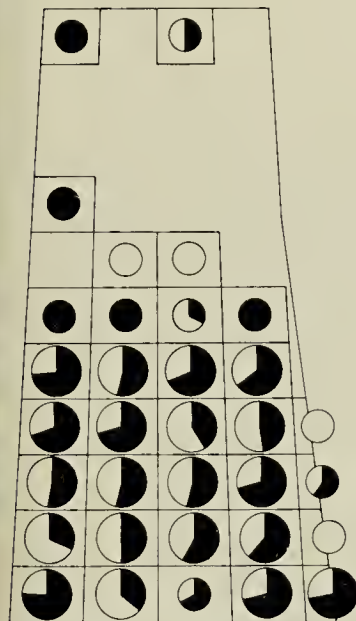
EVENING GROSBEAK



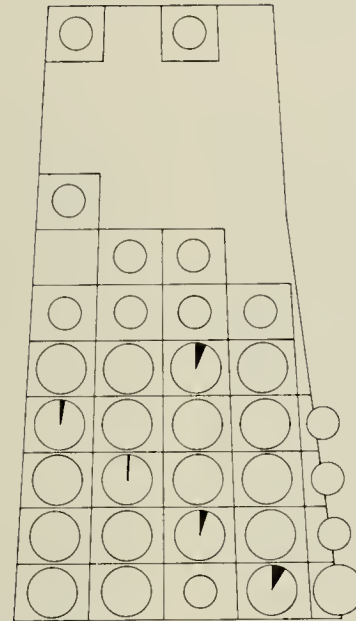
PINE GROSBEAK



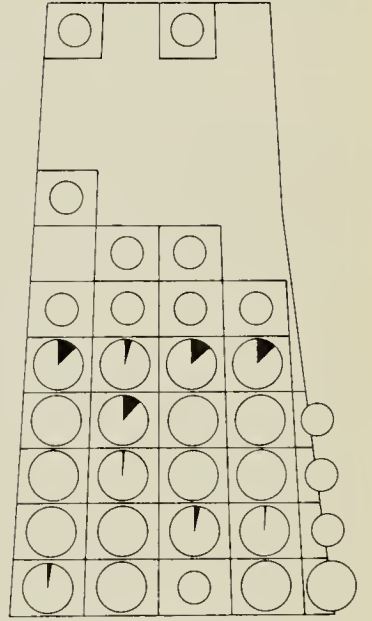
HOARY REDPOLL



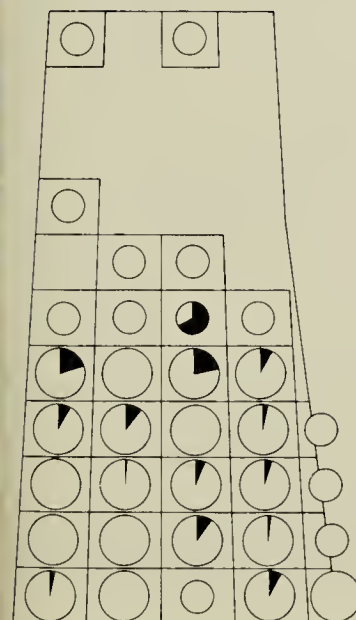
COMMON REDPOLL



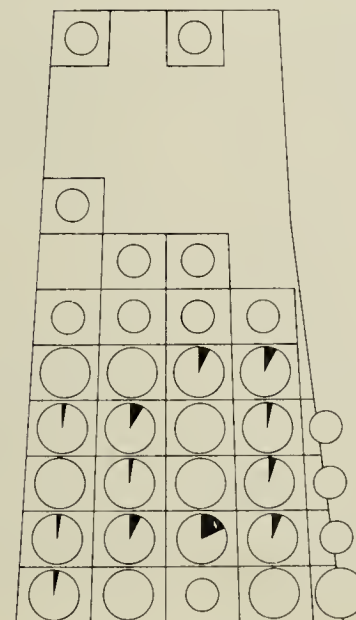
PINE SISKIN



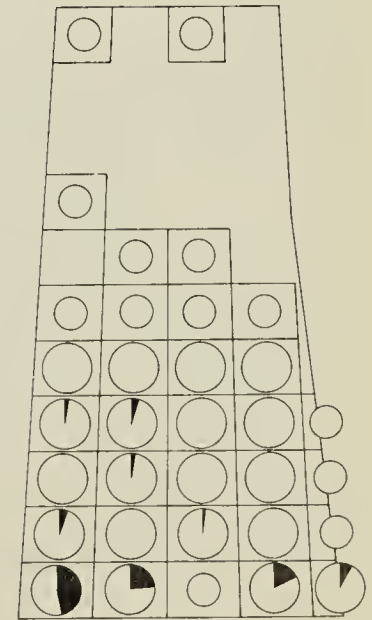
RED CROSSBILL



WHITE-WINGED CROSSBILL



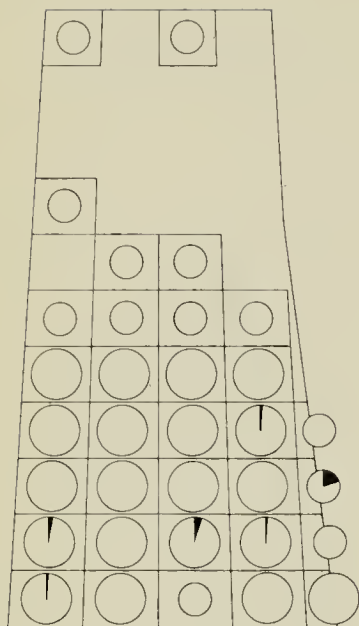
DARK-EYED JUNCO



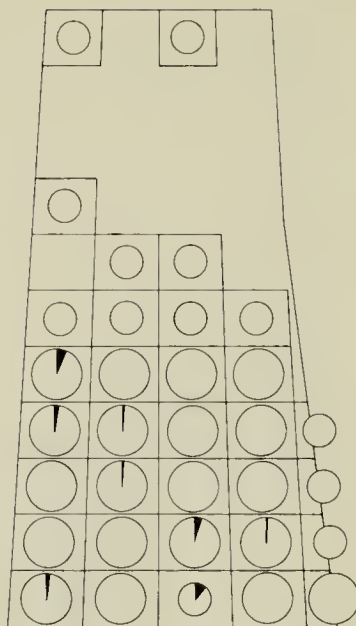
TREE SPARROW



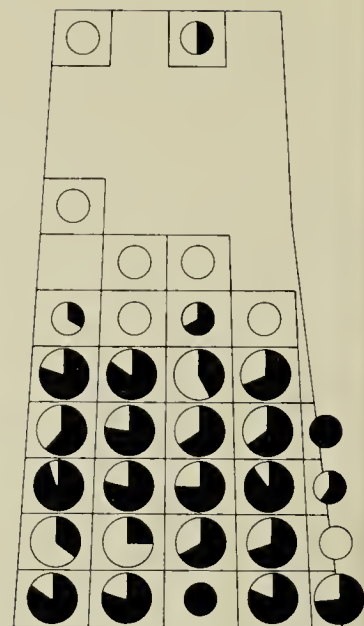
## DISTRIBUTION MAPS



SONG SPARROW



LAPLAND LONGSPUR



SNOW BUNTING

distribution maps have incorporated observations of species that were present during the latter half of December or early January, but not necessarily during Christmas week. When organized Christmas Bird Counts were first undertaken in the early 1940's, the count period was relatively short, extending only from Christmas Day to New Year's Day. This period was later lengthened to 14, then 16 days from mid-December to early January.

An example of the regularity, frequency and abundance summary is as follows:

**HAIRY WOODPECKER.** 35 years; 439 counts (rank, 9); 874 individuals (rank, 21). This indicates that the Hairy Woodpecker was recorded in all 35 years; on 439 of a possible 920 counts (making it the 9th most-frequently recorded species); with a total of 874 individuals on count day (making it the 21st most abundant species).

Common names of species and the order in which they are presented follow the latest American Ornithologists' Union Checklist and revisions<sup>1 2 3</sup>; thus Red-shafted and Yellow-shafted Flicker are regarded

as one species, Common Flicker; Oregon and Slate-colored Junco are treated together under Dark-eyed Junco. Each of these four subspecies has been recorded at least once on Saskatchewan Christmas Bird Counts. Subspecific common names are maintained in the respective species accounts.

Within the province of Saskatchewan 121 species have been recorded on count day and six species have been recorded as additional species during count period. In the following annotated list, count period observations (made during count period but not on count day) are preceded by CP; often no date is available. Distribution maps are included for species marked with an asterisk (\*).

### Additional Notes

**Sharp-tailed Grouse.** A Greater Prairie Chicken X Sharp-tailed Grouse hybrid was observed at Raymore on December 24, 1971 (CP observation).

**Sage Grouse.** A higher Christmas Bird Count total of 30 individuals was made at Eastend on December 26, 1935.<sup>4</sup>

**Chukar.** These observations followed local



releases. The species were unable to survive the severe winters. None of the introductions was successful.

Rock Dove. Rock Doves were not counted on Christmas Bird Counts prior to 1958. Much higher ranks for frequency and abundance would be expected if the species had been counted over the entire 35-year period.

<sup>1</sup>A.O.U. 1957. Check-list of North American Birds. 5th Ed. American Ornithologists' Union. 691 pp.

<sup>2</sup>A.O.U. 1973. Thirty-second supplement to the American Ornithologists' Union Check-list of North American birds. Auk 90:411-419.

<sup>3</sup>A.O.U. 1976. Thirty-third supplement to the American Ornithologists' Union Check-list of North American birds. Auk 93:875-879.

<sup>4</sup>HOUSTON, M. I. and C. S. HOUSTON. 1976. Prairie Christmas Bird Counts, 1906 - 1941. Blue Jay 34:214-219.

<sup>5</sup>RICHARDS, J. H. and K. I. FUNG. 1969. Atlas of Saskatchewan. University of Saskatchewan, Saskatoon. 236 pp.



Dark-eyed Junco

Doug Gilroy



# THE AMERICAN WOODCOCK IN MANITOBA

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The American Woodcock has been recognized as a breeding bird in extreme southeastern Manitoba since 1886.<sup>1 3 10 48 51 55</sup> The most recently published account shows this distribution fairly well (see Fig. 1).<sup>46</sup> Because the woodcock is mainly crepuscular, it has been observed in this province by relatively few persons.

This woodland-nesting shorebird, with its stout body, large head and short neck, relatively short legs and long bill, is readily recognized when seen on the ground or in flight. It tends to sit close and flush at the last moment, rising upwards on short wings that make a distinctive sound. The males have a harsh, penetrating call given while on the ground — a sharp, nasal "peent". The call is rarely heard during daylight hours, but early in the morning, late in the evening and at night, the characteristic "peent" permits immediate identification. The male also has a complex aerial flight accompanied by both vocalizations ("chirping") and mechanical sounds ("twittering") produced by its three vibrating outer primaries. The male's spectacular courtship display is usually performed about half an hour after sunset, in the equally dim light before dawn and on moonlit nights.

In eastern Canada and the United States the woodcock is plentiful and is a popular game bird. In 1975, for example, 130,898 woodcock were taken by hunters in Canada, 65,469 being harvested in Ontario.<sup>4</sup> The annual continental kill at times reaches one and a half million birds and is increasing.<sup>46</sup> In Manitoba, however, the bird is at the Westernmost part of its breeding range and occurs in relatively limited numbers. Little information is available on its status or population since it has not been the subject of any official investigation by

provincial wildlife authorities. In 1876 it was protected in Manitoba from May 25 to August 15<sup>9</sup> but this merely represented the broad application of a protective attitude in Canada, without reference to local occurrence of the species.

## Earlier Observations

The earliest Manitoba record appears to be that of Thomas Palliser who shot two woodcock on July 23, 1857, presumably at Marion Lake, an oxbow of the Red River south of St. Jean Baptiste. He noted as follows: "... we stopped for dinner at a lake which has been, at one time, a bend of the river, but which is now converted into a lagoon ... while here, we shot a brace of woodcocks in some alders which skirt the lake. This bird, although very common in Canada (bear in mind the date and locality), is said to be only a rare visitor in this quarter."<sup>47</sup>

Thompson (Seton) reported the following for this species: "Very rare summer resident. Winnipeg: rare; only two pairs killed, and under a dozen birds seen altogether in 4 years (Hine). I saw one specimen of the woodcock (quoting Bell) at York Factory, in the end of August last (1879). This bird is not uncommon in Manitoba, although the fact is not generally known (Bell, 1880). Oak Point: 1885, first seen May 13; rare; one was shot (Small). Rare summer resident; I shot ten birds (quoting Nash) in 5 years near Portage la Prairie; in 1886 I found a pair breeding near Winnipeg; arrive about the end of April, depart in September (Nash)."<sup>11 55</sup>

Wallis flushed a woodcock near Westbourne on August 10, 1908; F. Rhind, Westbourne, told him that 20 years earlier (1888?) a number had been shot at the same spot. Rhind also said that in 1902 or 1903 wood-



cock were "very plentiful" on ranchland on the southwest shore of Lake Manitoba.<sup>58</sup>

A. G. Lawrence, a Winnipeg naturalist, went to considerable efforts to solicit records through his enthusiastic and knowledgeable accounts of birds in a nature column in a Winnipeg newspaper. Upon receiving his second report of a woodcock sighting in 1928 he made a special attempt to arouse an interest in this species. His columns record observations of woodcock for 16 out of 28 years in the period 1923 to 1950. Of 30 reports during this period, 19 were for eight years, from 1931 to 1938, when the bird seemed more abundant than usual. Half of the 30 reports were for Winnipeg (and suburbs), suggesting the occurrence, as so often mentioned in his column, of a local breeding population (or possible an increase in the provincial population?). He gives two general accounts that are of particular interest. In his 368th column,<sup>15</sup> Lawrence reported as follows:

"A record of unusual interest comes from A. Mount, North Kildonan, Man., who states that on March 19 (1928) a Woodcock flew up from near the creek on Lot 54, passing above his head and giving him an excellent view of its characteristic build and markings. Mr. Mount states that he has seen a Woodcock frequently during the past two summers (1926, 1927) in the same vicinity, the bird generally flying at dusk from the woods by the creek to a bluff some distance away. . .

"Southern Manitoba is about the northern and western limits of the Woodcock's range and consequently records of its occurrence here are scarce. There are old authentic reports of birds taken at Winnipeg, Portage la Prairie, Oak Point, Stuartburn and Cooks Creek, south of Tysdall, the latter a record of ex-sheriff Collin Inkster who shot a young one in September 1879 or 1880. Dr. R. Bell of the Canadian Geological Survey, saw a single bird at York Factory, Hudson Bay, in August 1879, apparently a straggler. N. Criddle, Treesbank, Man., informs us that the bird is rare there, he having seen about five Woodcock in thirty years, the latest fully a dozen years ago. The most recent report we have is that of R. D. Bird who saw a Woodcock in Assiniboine Park, Winnipeg, on October 7, 1923.

"From 1920 to 1923 a number of hunters reported to the Provincial Game Department that they had shot Woodcock, 58 in four years, but as the Wilson Snipe is constantly confused with the Woodcock, little reliance can be placed on this figure, though there is a possibility that some of the birds were Woodcocks."

Later he added<sup>29</sup>: "The American Woodcock is of particular interest to Winnipeg ornithologists as, in spite of its being believed to breed in or near the North Kildonan Bird Sanctuary, it has for ten years outwitted the birdmen and the first nest for Manitoba has yet to be recorded. The birds were seen in this area in subsequent summers (since 1928) by H. D. Whellams, A. B. Gresham, and others, but we were not among the favored few.

"While these North Kildonan records are the only spring reports of Woodcock, hence their unusual interest, the bird has been seen and reported in 'Chickadee Notes' nearly every fall since 1928 in other areas near the city and at other points in southern Manitoba in both spring and fall. Around Winnipeg, the birds have been observed in St. Vital (A. W. Murdoch); St. James Park, Winnipeg (Dr. H. M. Speechly); St. James (Major J. P. Oliver, C. L. Broley); Bird's Hill (a wounded bird brought to the Free Press by an unknown reader); Elmwood Park, Winnipeg (G. Ferris); and in Tuxedo from August 25 to 29, 1936, by Allan Morrison.

"Mrs. J. R. Glassey, St. James now reports to Professor V. W. Jackson that a Woodcock was in their garden last summer (1936) from July 19 to 30 and again from August 24 onwards for some time."

Despite these early reports of the woodcock in southeastern Manitoba, and Lawrence's many records, the status of the species has remained, in the viewpoint of most birders, essentially unknown, Lawrence himself, for example, said: "it is so rare here (southeastern Manitoba) that an observation deserves a headline."<sup>33</sup> Shortt considered an injured woodcock found in Winnipeg "a notable addition to Manitoba's bird records."<sup>52</sup> Referring to a Stonewall record of April 29, 1966, the late Harold Mossop reported: "Although I have been birding for well over half a century (in Manitoba), I have seen just two of these extremely interesting birds in the wild".<sup>41</sup> In the same column, however, Mossop



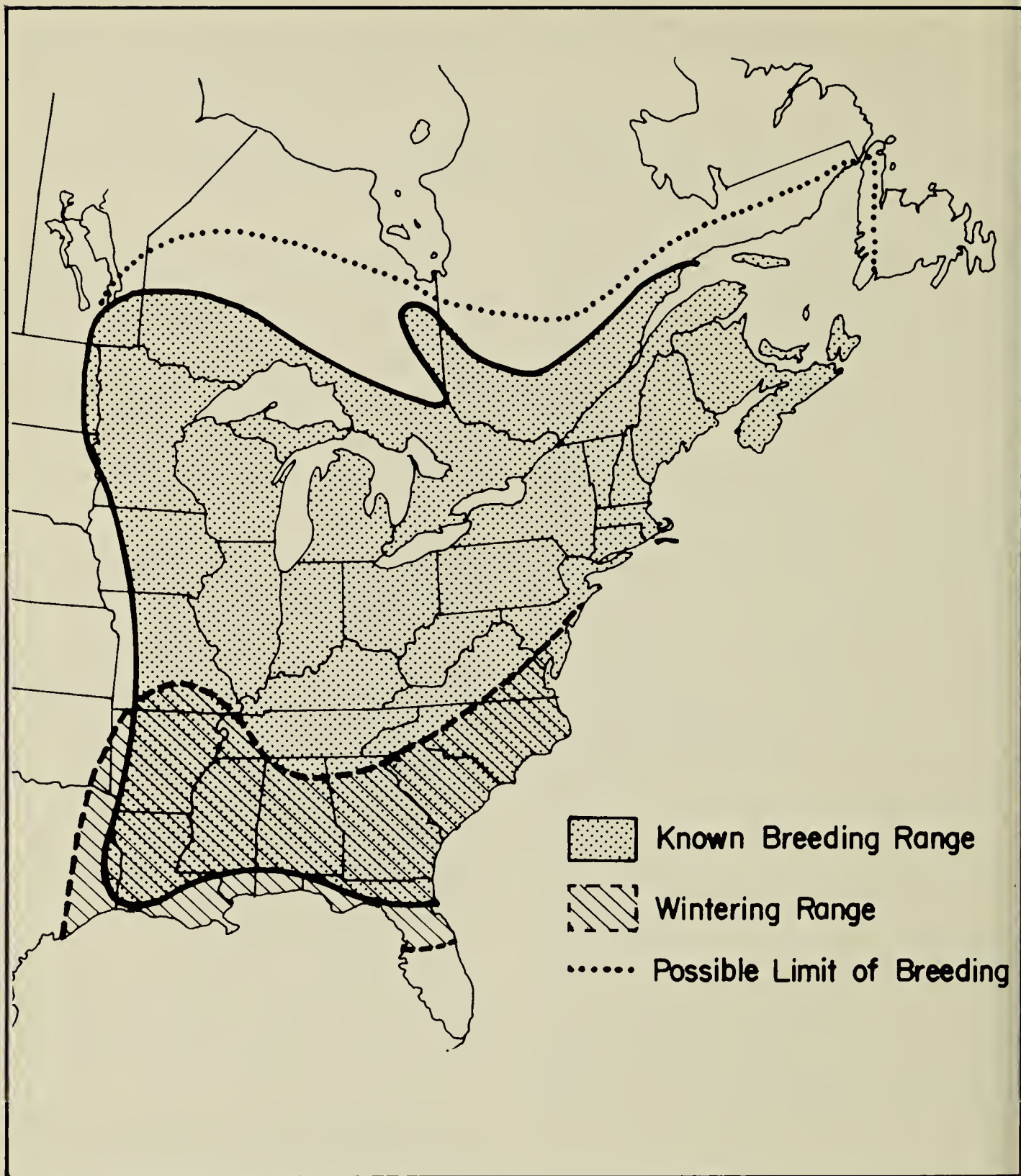


Fig. 1 Woodcock breeding and wintering ranges in North America (after Owen, 1977).<sup>46</sup>

added: "Perhaps they're not so rare here as supposed. Being so well camouflaged as they sleep all day, perhaps we're just overlooking them." Notwithstanding this perceptive comment, and although born and raised near Winnipeg, Gardner went so far as to state: "it is not recorded every year in this province."<sup>8</sup>

### Recent Observations

Observations made by myself and others in recent years show that the

American Woodcock continues to flourish in Manitoba, annually returning to occupy certain sites and occasionally appearing temporarily in new areas. It regularly occurs in a limited area of extreme southeastern Manitoba as a fairly abundant resident and may occupy a larger breeding range than is now known.

My first observations of Woodcock in Manitoba were made during my second year of residence here when



two single birds were seen in August and September, 1967, about 30 and 50 miles respectively east of Winnipeg. One flushed at my feet at midday, the other flew across a road in front of my car at dusk. Not since I had made "peenting counts" as a graduate student and hunted them years ago in Wisconsin had I seen a woodcock. I next observed a woodcock on April 25, 1970, when, in company with Robert Taylor and Gordon Graham, a bird, suspected to be a breeder, was flushed from a wooded area at Piney (see under "Breeding Evidence"). A year later, Herb Copland and I stopped late in the evening of April 9, 1971 at East Braintree to listen for Great Gray Owls; as soon as I rolled my window down I heard the peent of a woodcock. We stayed long enough to distinguish four peenting birds and watched them display overhead in the fading light.

Thereafter, my colleagues and I took a special interest in woodcock, stopping to listen for them in likely spots whenever there was opportunity. Because most of our time was spent searching for Great Gray Owls, only limited time was given to this activity. Also, because our efforts to find owls was largely confined to the wooded region south of Lake Winnipeg and east of the Red River valley (south into northern Minnesota), most of our experience with woodcock relates to this area.

Between 1971 and 1977 we observed woodcock regularly at nearly a dozen sites between Lac du Bonnet and Piney (see Fig. 2). Numbers of displaying birds at these sites ranges from 5 to 20 or more. Because birds were present in these specific areas every year during the breeding season they were assumed to be breeding.

The nearest breeding site to Winnipeg known to us was between Anola and Vivian on Provincial Road 15, about 20 miles east of the Red River Floodway. We introduced a number of birders to woodcock by leading or directing them to this particular site. Efforts to find birds in similar habitat at other sites, for exam-

ple, south to the TransCanada Highway, in the vicinity of Steinbach, and southeast along Provincial Trunk Highway 12, were unsuccessful. Many times we attempted to find birds in what appeared to be suitable habitat adjacent to known breeding grounds, again with little success. We concluded that although woodcock were widely scattered across extreme southeastern Manitoba, they occurred in restricted localities, separated by large, unoccupied areas. Nevertheless, we recognized that with more time and effort, woodcock would probably be found in many additional places within this general area.

A growing impression that woodcock were restricted in breeding range to the area east of Winnipeg was abruptly changed in 1974, when graduate student Tim Sopuck discovered five birds, apparently on territory, 12 miles west of Hodgson and about 85 miles north-northwest of Winnipeg. Woodcock were observed peenting and giving aerial displays every night from about May 31 through the first week of June, 1974 (pers. comm., 1974). Tape recordings made at the site by Terry Dick, University of Manitoba, were readily identified as woodcock by Herb Copland (pers. corres., 1974). The area, which lies just outside the southeast corner of the Mantagao Wildlife Management Area, consisted of low land covered with alder and pastured, young aspen poplar stands. The number of birds, constancy of peenting and aerial displays, and period of activity, indicates breeding.

Additional breeding in the Interlake is strongly supported by observations of fall migrants at Sandridge, about 45 miles north of Winnipeg. Don W. Simkin, Toronto, Ontario, reported (pers. corres., 1977) as follows:

"Two of us, using pointing dogs, hunted the shoreline of the large slough just north of the hamlet of Dennis Lake and just east of Sandridge for about 3 hours on October 5 (1976). Our quarry was non-mallard ducks and any snipe and ruffed grouse which we might encounter.



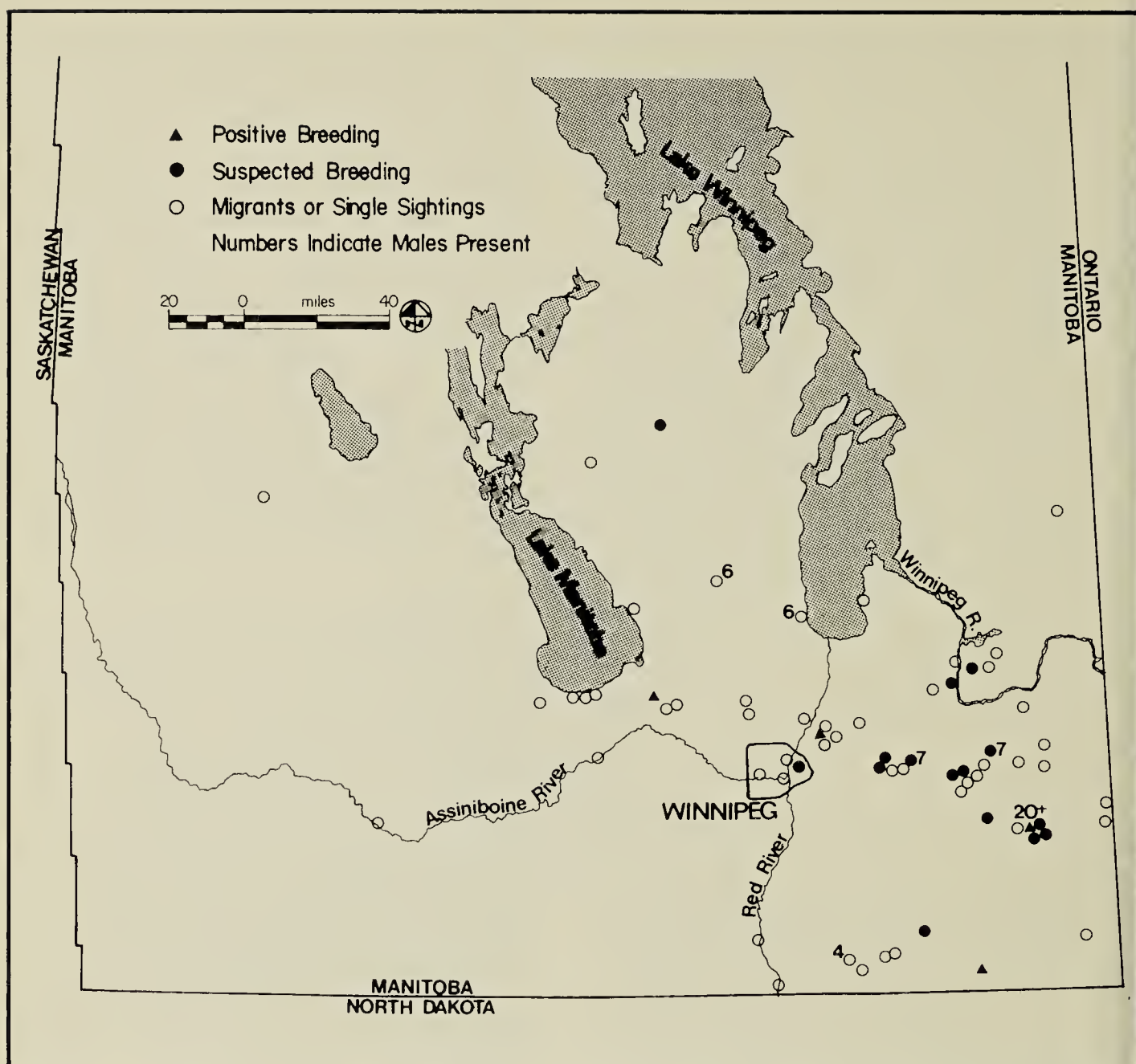


Fig. 2 Manitoba Woodcock locality records 1857-1977.

"The habitat which we hunted was quite similar to cover which we most frequently hunt for woodcock in Ontario — namely, pole-sized aspen with a slightly damp organic soil base.

"During the period that we hunted — each on opposite sides of the rather large body of shallow water (the extreme southwest end) — we flushed at least 6 woodcock — 3 each — and, on average, reflushed them at least once. For each woodcock flushed, we probably put up 6 snipe. The snipe were located in the fresher areas immediately adjacent to the open marsh.

"Although I have hunted in the interlake country on two other one-week trips — mainly in the Gypsumville-Waterhen Lake area, this is the first time that I have put up any woodcock. It probably is worth noting, however, that the cover we hunted on the day we en-

countered woodcock was the only cover where, before going into it, one got the feeling he was going into woodcock habitat according to our Ontario conditioning."

The occurrence of woodcock north of Whiteshell Provincial Park, in the newly established Nopiming Provincial Park, has recently been documented by Calvin Cuthbert (pers. comm., 1977).

"A single bird was heard 'peenting' and observed engaged in its aerial courtship display during the late evening of May 11, 1977 and again early the following morning at Long Lake, approximately 28 miles southeast of Bissett. This is typical pre-Cambrian Shield country with jack pine on many rock ridges and white spruce and



aspen throughout much of the lower, richer soil areas. A number of summer cottages are situated at Long Lake and it was here the woodcock was observed. Its habitat consisted of a small, low-lying area throughout which willow clumps and aspen grew intermittently. This area was surrounded with rock. It was presumably either a migrant or encountered a mishap as it was not heard or seen again after the morning of May 12, despite numerous attempts to relocate it. The bird was seen by Bill Koonz, Nick Foy and myself."

## Breeding Evidence

Under breeding range, Bent makes two references to Manitoba as follows: "North to southern Manitoba (Brandon, Portage la Prairie, and Winnipeg) . . . West to . . . southern Manitoba (Portage la Prairie)."<sup>3</sup> The reference to Brandon is likely based on Criddle's records (five in 30 years, the latest around 1916; presumably migrants about 18 miles southeast of Treesbank. Similarly, Portage la Prairie was evidently chosen in relation to Wallis' Westbourne record (14 miles NW). Neither records supply an indication, however, of breeding status. The earliest basis for giving the species breeding status in the province appears to be the observation by C. W. Nash of "a pair breeding near Winnipeg" in 1886.<sup>55</sup> Unfortunately, no further information is available for this suggestive report. The "young" woodcock reported shot by Inkster near Cooks Creek in September 1879 or 1880, and later mounted, was presumably an immature bird, but it is not known how this age determination was made. In any case, an immature bird with full flight capability (this would have to be the case by September) would not necessarily have been raised in that vicinity. J. M. Waddell, who reported four birds on May 30, 1928, southeast of Stuartburn, believed that they were breeding in that area.<sup>16</sup>

The almost annual occurrence of birds in spring and summer in the North Kildonan Bird Sanctuary from 1926 to 1937, led to a general supposition that they were breeding in that area.<sup>15 16</sup> As noted by Lawrence<sup>29</sup>:

"Suffice it to say that the occurrence of so many Woodcock around Winnipeg in fall indicates that a nesting haunt must be in this vicinity; who will solve this nesting problem?" On May 22, 1949, in St. Vital, a freshly killed female woodcock was found; the "largest yolk (sic) in the ovary (was) about an eighth of an inch in diameter indicating, we believe, that the bird had laid its eggs"<sup>37</sup>

The rather regular occurrence of small populations in southeastern Manitoba led Godfrey to assume that the woodcock was a breeding resident.<sup>10</sup> He notes that a freshly laid egg found in 1970 is the "most definite evidence of nesting of which I am aware" (pers. corres., 1970). The details of the circumstances under which the egg was found follow: On April 20, 1970, Gordon G. Graham, Conservation Officer, found an egg resting on top of fresh snow near the edge of a woods adjacent to the C.O. residence at Piney. A pair of woodcocks had been seen nearby at the same time. A two-inch accumulation of snow which fell on April 18 and 19 presumably interrupted nesting, leading to the laying of the egg on the snow. Robert Taylor and I visited the area on April 25, obtained the egg (now in the collections of the Manitoba Museum of Man and Nature), and together with Graham, flushed a woodcock from the same area. This was a flooded hummocky woods. Evidently the birds were feeding on the exposed tops of the loamy hummocks. Woodcock were observed in this same locality in several successive years.

Following the above discovery, I made efforts over the next few years to find a nest. On several occasions I searched areas where woodcock regularly occurred, at times using a springer spaniel, but without success. As noted by Sheldon, however, "finding nests or young birds (of woodcock) is a matter of chance", the female sitting close on the nest and being well camouflaged.<sup>51</sup>

A road-killed female woodcock found on April 17, 1974 near Vita by N. Foy was clearly in breeding condi-



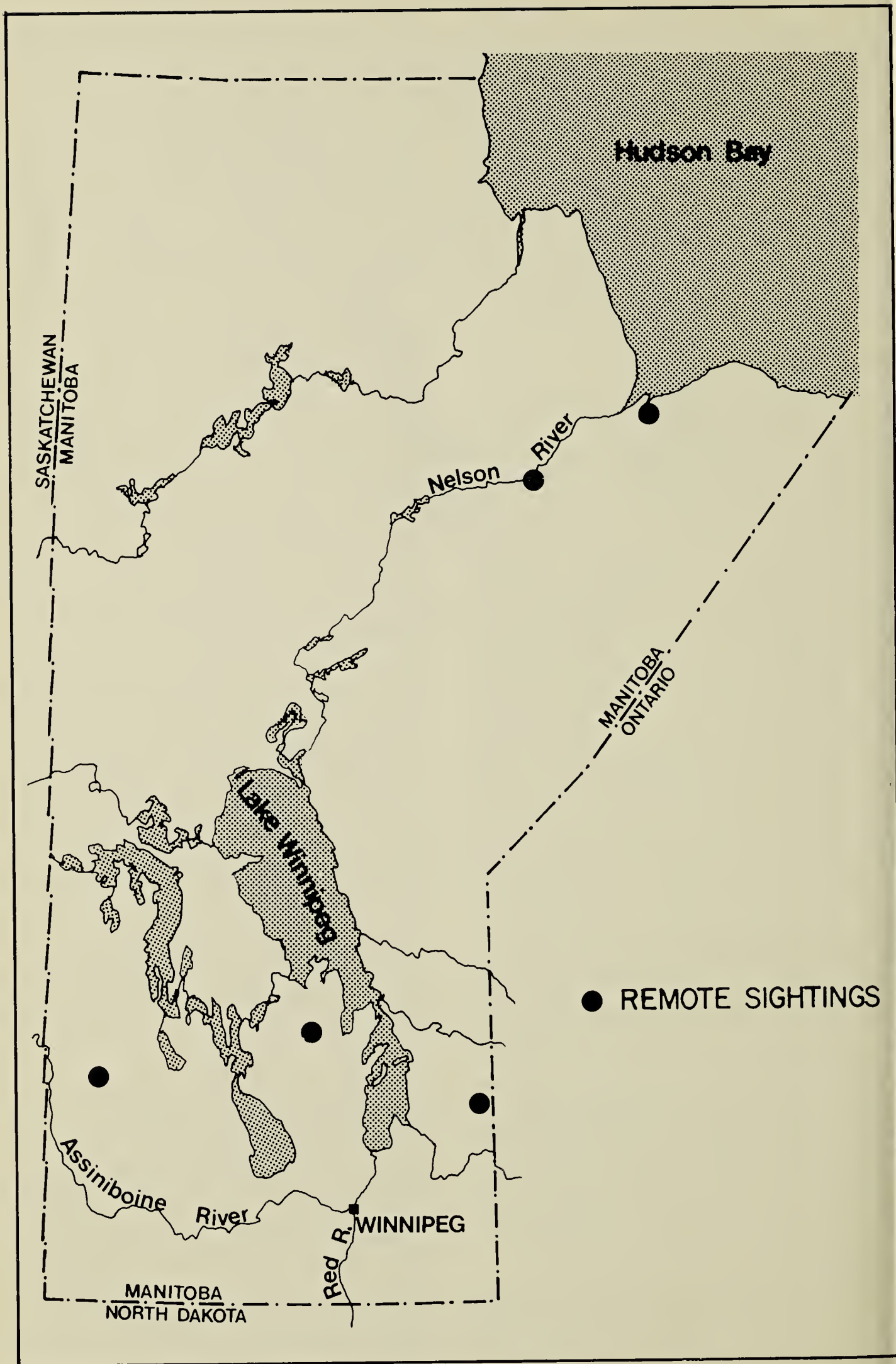


Fig. 3. Extreme northern woodcock records and more remote records for southern Manitoba.



tion; it had an enlarged oviduct and the largest follicle was 8 mm. in diameter; the bird weighed 168.5 grams (pers. corres., S. G. Sealy, 1977).

In 1975, a brood of three young woodcock, the first reported for Manitoba, was encountered by chance by Eugene F. Bossenmaier. His detailed account of the event (pers. corres., 1975) follows:

"The sighting was made on May 24, 1975 about 4:00 p.m. in a tract of rich, mature, ungrazed aspen forest lying 5 miles north northwest of Reaburn, Manitoba. Clearings — gravel pits, wet meadow adjacent to a bulrush pothole, and a grassy ridge — adjoin the aspen forest. The forest itself consists of open aspen trees with a good shrub understory: willow, highbush cranberry, red osier dogwood and saskatoon, the particular species coinciding with the different moisture regimes within the forest.

"The adult, presumably the hen, flushed about three feet from me as I was moving slowly through some red osier dogwood that lies about 20 feet from the edge of the grassy ridge. Her peculiar flight — body almost perpendicular but parallel to the ground, in a sort of semi-stall — made me suspect a nest. Instead, at my feet, I found 3 downy young, motionless and prostrate. I estimated they were 2-3 days old, about the size of day-old pin-tail ducklings. I did not measure their bill length but on retrospect believe it was about 20 millimeters.

"I handled one of the young and when it was returned to the ground all three began peeping and walking away which brought the adult back in flight. A couple of times it came within 6 feet of me alternating with returning to and landing on the edge of the grassy ridge where it feigned injury. The whole episode from first flushing to my departure from the scene lasted about two minutes."

Reaburn is about 18 miles northeast of Portage la Prairie and 25 miles northwest of Winnipeg. It is an area with extensive grazed and ungrazed aspen and oak woodlands and willow-bordered sloughs. The above brood record may not have been an isolated breeding occurrence. Only six miles to the east a peenting male was observed by B. K. Tully from early March to mid-June, 1976 (pers. cor-

res., 1976). This was almost certainly a breeding bird. The following year S. Jonasson heard a bird peenting for two nights in early May, 1977, about a quarter mile away (pers. corres., Tully, 1977).

On June 13 or 14, 1976, Carl Feilberg accidentally drove a vehicle over a newly-hatched woodcock chick, presumably one of a brood, near his home west of East Braintree, an area in which annually a large, resident woodcock population may be found. The behavior of a distraught female called his attention to the dead downy chick. This was on an old logging trail in second growth aspen poplar about two miles southwest of East Braintree. The site was a low spot on an aspen ridge with about eight inches of grass and alders nearby and bordering the edge of an old field; it was damp but not wet.

Willard Anderson and John Patimore discovered another brood in Birds Hill Provincial Park northeast of Winnipeg on May 12, 1977. In Anderson's words (pers. corres., 1977)<sup>13</sup>:

"We were walking in the south end of Birds Hill Park in the south part of the loop in an area that was very wet, a fair amount of water on the surface, and largely willow with game-trails bisecting it. I nearly stepped on a female woodcock before she flushed and put on a broken wing act for us. John went to have a closer look at the mature bird and I examined the ground where she was sitting to find two chicks. The chicks were about tennis ball size literally a ball of fluff. Head and back markings were very evident and the two chicks remained very motionless."

The above brood record is supported by sightings in or near Birds Hill Park in recent years, namely one on May 19, 1971 by W. Harris and A. Nijssen (pers. comm., H. W. R. Copland, 1971) and another by H. Stankey on July 15, 1976 (pers. comm., 1976).

In central and southern Ontario woodcock eggs are usually laid in early April.<sup>5</sup> With an incubation period of 20 to 21 days, the two chicks found at Birds Hill Park must have hatched from eggs laid about April 20-21 (or earlier if they were not newly-hatched). This is supported by the



Table 1. Woodcock reports from Winnipeg (including Birds Hill Provincial Park area) and localities to the north and west, 1960-77\*

Year	Place	No.	Month	Observer(s)
1966	Stonewall area	1	April	W. Shephard
1966	Stonewall area	1	May	B. D. Stewart
1967	Winnipeg	1	September	Mrs. J. D. Bourns
1967	Winnipeg	1	September	Mrs. N. G. Phillips
1967	Winnipeg	1	September	A. Wittneben, H. Mossop
1970	Winnipeg	1	August	Mr. & Mrs. R. R. Shearer
1971	Birds Hill P. P.	1	May	W. Harris, A. Nijssen
1974	Winnipeg	1	April	L. T. Simmons
1974	Hodgson area	5	May-June	T. Sopuck
1974	Gillam	1	June	D. R. Beckett
1974	Winnipeg	1	August	J. L. Howard
1975	Marquette area	1**	May	E. F. Bossenmaier
1976	Marquette area	1	March-June	B. K. Tully
1976	Delta	1	July	S. G. Sealy
1976	Birds Hill Park area	1	July	H. Stankey
1976	Delta	1	August	R. Wishart
1976	Camper area	1	October (?)	M. Walker
1976	Sandridge	6	October	D. W. Simkin
1976	Winnipeg	2	Sept.-Oct.	A. W. Scarth
1977	Winnipeg	1	April	L. Logan, L. Hyde
1977	Marquette area	1	May	S. Jonasson
1977	Birds Hill P. Park	1**	May	W. Anderson, J. Pattimore
1977	Nopiming Prov. P.	1	May	C. Cuthbert et al.
1977	Delta	1	July	S. G. Sealy

\*NOTE: Table does not include an abundance of records eastwards of Winnipeg.

\*\*Female with brood.

April 20 egg date at Piney. Even earlier nesting is possible, for woodcock have arrived at Winnipeg as early as March 19.<sup>15</sup> March and April 1977 were unusually warm and dry months in southern Manitoba.

Migration

Woodcock winter range is in southeastern United States, in coastal states from New Jersey to eastern Texas, and north to southern Missouri. The bulk of the continental population, however, winters in southeastern Arkansas, Louisiana, and southwestern Mississippi.<sup>1</sup>

Recent research in Minnesota indicates that males and females are believed to arrive together (pers. corres., R. O. Morgenweck, 1977), the males establishing territories where they carry out territorial and courtship displays. Bent notes that: "The woodcock is the first of our waders to migrate north and one of the earliest of all our migrants, com-

ing with the bluebirds and the robins, as soon as winter has begun to loosen its grip. The date depends on the weather and is very variable, for the bird must wait for a thaw to unlock its food supply in the bogs and spring holes . . . early birds find a living about the big ant hills, until the alder covers (sic) are ready for them."<sup>3</sup>

Little information is available on arrival dates in Manitoba, but of 43 woodcock observations (1928-1977), 14 are for April, 27 for May. Disregarding the number of birds observed on each date, by mid-May, if not mid-April, most woodcock are probably back in the province and on territory. The earliest arrival dates are: one near Marquette "the first week of March", 1976 (B. K. Tully, pers. commun., 1976, 1977); one seen in Winnipeg, March 19, 1928 (A. Mount)<sup>15</sup>; and two at East Braintree, March 24, 1973 (R. W. Nero).

The above three dates are probably exceptionally early records, but there is good evidence that all were loca



resident males. The bird observed by Tully, for example, was heard peenting at least until mid-June; moreover, in the previous year a brood was found not far to the west of that site. Mount's 1928 observation was made in an area where he had frequently seen birds during the past two summers.<sup>15</sup> Birds were also seen in that area in subsequent summers. My observation on March 24 was of two males, not only peenting but in full aerial display on a known breeding grounds, showing that even earliest arrivals are ready for breeding and competing for territory. The bird that arrived at Marquette in early March had to contend with a foot and a half of snow. The persistence of that individual, which peented nightly despite the deep snow and low temperatures, indicates the hardiness of this species.

Spring migration in Minnesota runs from "late March through early May with a peak in mid-April." Earliest arrival dates in northern Minnesota are March 20 to March 30.<sup>11</sup>

There is good evidence that woodcock may still be migrating here in early May. Late in the evening on May 8, 1976, Herb Copland and I counted 31 peenting woodcock while driving slowly along a 3 mile stretch of highway about 5 miles south of South Junction, just over the border in Minnesota. This is an area where only a few birds were ever found on territory. Owing to the casual method of our survey this would have been a minimal count of the birds in the area.

Because woodcock peent while on migration, records of birds in some localities, especially early in the season, may not indicate residents. Only through repeated visits to a site can prolonged occupancy and, hence, probable breeding be determined.

Movement of birds from breeding grounds in Manitoba may begin in July. A woodcock was captured in a mist net and banded at the University of Manitoba Field Station at Delta Marsh, July 26, 1976; another was flushed in almost the same place on July, 1977 (pers. corres., S. G. Sealy,

1977). (Incidentally, the first woodcock banded in Manitoba was a territorial bird taken in a mist net deliberately set by Herb Copland 5 miles south of Lac du Bonnet on May 22, 1972.) Other Delta Marsh records include one seen by Rick Wishart on August 21, 1976 (pers. corres., 1977), and one seen on May 6, 1948 by Evans and Sows.<sup>36</sup> These observations of birds along the Delta Beach ridge may be of local breeding birds or migrants from farther north.

One informant reported to me that a group of people known to him have hunted woodcock somewhere in the Brokenhead River vicinity east of Winnipeg every August for the past several years. He stated that birds were apparently present each year and were believed by these illegal hunters to be local breeding birds. According to Creighton: "As the year progresses, woodcock live in different areas with varying plant life. During courtship and nesting in the spring, they select open fields and young forests. In the summer, they frequent dense alder and shrub thickets. In autumn, they concentrate in damp woodland area, particularly alder swales and poplar tree stands on imperfectly drained sandy loam soils."<sup>5</sup>

In earlier years, when woodcock were apparently breeding in suburban Winnipeg, autumn records were possibly of local birds that delayed their passage to rest and feed. Such was probably the case for a bird seen in Winnipeg by G. Ferris from mid-September to October 20, 1934.<sup>16</sup> On the other hand, the abundance of autumn records, as pointed out by Lawrence,<sup>29</sup> suggests the occurrence of migrants from elsewhere. Two birds watched almost daily on lawns on the bank of the Red River in Winnipeg from September 29 to October 10, 1976 (pers. corres., A. W. Scarth, 1976) could have come from local or distant populations. One of the latter birds was photographed in color by Alan Scarth.

Of 88 Manitoba sightings, 25 are for September and October. Late dates are: October 17, 1970, one near Shoal





Craig Borck

Woodcock nest. Note the white droppings; this often occurs when a female is frightened off the nest.

Lake, W. G. Leitch; October 18, 1975, one at Waugh, P. E. Long (pers. corres., W. G. Leitch, 1977); October 19, 1975, one seen near Lewis, south of PR 15 (pers. corres., M. Page); October 20, 1951, an apparent road-killed specimen from Gardenton (Man. Mus. Man & Nature). The latest fall date for northern Minnesota is November 2.<sup>11</sup>

### Distribution

Judging by what is now known, woodcock occur regularly as breeding residents south of Lake Winnipeg and east of the Red River;

irregularly west to within 50 miles of Winnipeg; and irregularly north to within 85 miles. The area south and west of Winnipeg, which is mostly intensively cultivated, may attract few birds. However, it should be noted that, although it is regarded only as a hypothetical breeding bird in North Dakota, there have been several records in eastern North Dakota, west of the Red River, including a reported breeding at Bathgate, 15 miles southwest of Emerson.<sup>54</sup>

An early record of a pair at Antle Creek, in western North Dakota, just south of the Manitoba-Saskatchewan border, in April, 1923,<sup>54 48</sup> indicate



that this species may occasionally appear in localities beyond their normal range. This is supported by a record for Riding Mountain National Park, September 28, 1933,<sup>24</sup> where none has been observed since, and a report in fall 1960 for the Qu'Appelle valley north of Regina, Saskatchewan.<sup>12</sup>

There remains the possibility that some early records may indicate a fluctuating breeding range, e.g., the A.O.U. states that the woodcock "breeds from southeastern Manitoba . . . formerly to eastern North Dakota."<sup>2</sup> The Antler Creek, North Dakota, record for 1923 cited above, the five records at Treesbank, Manitoba in 1916 and earlier,<sup>16 29</sup> and the 1908 and earlier records reported for Westbourne and southwest Lake Manitoba,<sup>58</sup> further suggest the possibility of an occasional temporary extension of range. Mitchell, reporting for this same general period, noted: "No reliable records for the province (Saskatchewan), but its occurrence in south Manitoba and north-east North Dakota would indicate that reports of its appearance at Oxbow and Moose Mountain (in extreme southeastern Saskatchewan) may have some foundation."<sup>40</sup> The number of records in southern Manitoba from 1931 to 1938, as reported by A. G. Lawrence (already noted above), may be related to drought conditions.

Observations in even more remote localities have been reported. Tyrrell and Dowling recorded flushing a bird in suitable habitat on August 8, 1892, along the Fond du Lac River west of Black Lake in extreme northeastern Saskatchewan.<sup>56</sup> The record was found acceptable by Preble,<sup>50</sup> and was the basis for a later listing as hypothetical for the region,<sup>44</sup> and, indeed, for that province.<sup>45</sup> In Manitoba, R. Bell's record of a single bird at York Factory on Hudson Bay in August, 1879, was accepted by Preble,<sup>49</sup> but in recent years has been disputed. Manning, considered Bell's bird "more likely . . . a snipe"; but Manning flushed two birds "in dry, wooded country at Cape Tatnam" in late August, 1947, that "were believed

to be Wilson's Snipe. . . . They were not clearly seen, however, and it is just possible that they were woodcock."<sup>39</sup> Evidently, Manning, though skeptical of the Bell record, was sufficiently influenced by the latter observation as to leave a suggestion that he himself might have seen woodcock. At this point in time it hardly pays to speculate, but "dry wooded country" sounds more like woodcock than snipe habitat.

A new perspective on these northern reports has been provided by Sheldon who states: "I believe . . . that the range should be extended north to northern Ontario and James Bay."<sup>51</sup> He then notes that C. H. D. Clarke, in a letter of May 28, 1964, "reports the occurrence of woodcock populations in the James Bay area and farther north. In part Clarke says, 'We have a spring record from the junction of the Ashweig and Winsk rivers just south of Hudson Bay. Farther east the birds are found quite regularly on the way to the southern end of James Bay. There are a few spring records but most of the observations at James Bay have been made during the goose hunting season when woodcock are commonly encountered in the willows along the coast.'" Sheldon appears convinced that woodcock have long nested in these remote regions, stating: "In the vast wilderness of the North it is possible that woodcock breed in many suitable areas."<sup>51</sup>

That woodcock may nest much farther north in Manitoba than is now suspected is suggested by recent observations by Donald R. Beckett in the Gillam area, 100 miles southwest of York Factory and more than 450 miles north of Winnipeg (Beckett, pers. comm., 1977).<sup>7</sup> Beckett, who was familiar with woodcock in Port Arthur, Ontario, told me that on June 11, 1974, as recorded in his notes he saw one in typical nuptial flight. This was in late evening and he was able to see the bird flying over the top of some distant trees. He also glimpsed a bird on September 3, 1974, that he thought might have been a woodcock. The particular site where both birds were seen was a sandy ridge





Female woodcock on nest, June 1971, Keswick, Ontario.

Robert R. Taylor

about 8 miles east of Gillam. An old burn, it was relatively open and the site of a gravel pit. Jack pine covered the ridge and provided a screen behind the pit. An adjacent area was covered with willows and alder and was usually damp (see Fig. 3).

There may have been an increased number of woodcock and a range expansion in Manitoba in the 1970's, perhaps similar to that indicated by Lawrence's records for the 1930's. Populations east of Winnipeg apparently are relatively stable, but the appearance of birds to the north and west of that area during the 1970's is in striking contrast to the previous decade. From 1960 to 1969 inclusive, five reports of single birds are available; from 1970 to 1977, 19 reports of 25 birds were recorded (see Table 1). Whether these records represent a permanent extension of

range or a temporary phenomenon remains to be determined. Temporary expansion at this western extremity of the woodcock's range may be an event of occasional occurrence, perhaps linked to weather or population shifts elsewhere.

In the half century between 1926 and 1977, woodcock were recorded in metropolitan Winnipeg on at least 34 occasions. In several instances one or more birds were observed repeatedly over several days. Although Lawrence comments on the preponderance of fall records,<sup>29</sup> he noted that 24 of the 34 observations were made in spring and summer (March-August) as compared to fall (September-October). The reduced numbers of observations in Winnipeg now as compared to earlier times is probably due to a decline in habitat. This is likely to continue with



development and manicuring of parks and riverbanks. It is of considerable interest to note that the most recent Winnipeg observation, April 10, 1977, by Laurie Logan and Lorne Hyde, was made in Assiniboine Forest, a natural area park of 700 acres.

### **Habitat and Food Habits**

"Most woodcock are confined to young forest with some scattered openings on poorly drained land. . . . The woodcock is a sandpiper that has become adapted to the forest. Its unique physical adaptations and behavior can be explained as adjustments to a habitat remarkable for a shorebird, but it never lost the vestigial requirement for open space for courtship and breeding."<sup>51</sup>

Woodcock breeding grounds require open sites which may be abandoned fields, old pastures, clearings or even roads and trails where the male performs territorial and courtship displays, and where copulations take place. Generally, the plant succession on the openings is in the early woody stage. Nesting usually takes place within 150 yards of the singing field in a variety of cover, although open, second-growth woodland is preferred. "In the days before colonization, woodcock undoubtedly used natural openings in the forest — areas along stream beds, beaver 'meadows', clearings created by fire . . ."<sup>51</sup> Generally, the larger the trees, the larger the size of the opening or singing grounds.

The Manitoba sites where we regularly found woodcock, which were known or believed to be breeding, conform to the above. Most typically, abandoned fields with grassy cover, adjacent to second-growth aspen poplar and with some invasion of aspen into the field, predominated. In some cases, willow clumps surrounded or bordered open fields, but the willows backed onto forest stands. Elsewhere, old, clear-cut areas in coniferous or mixed-wood forest stands served as singing grounds. Invariably, alder and birch thickets were found nearby,

and often streams or low-lying, damp areas were close. The number of abandoned fields and clear-cut areas in extreme southeastern Manitoba may partly explain the prevalence of woodcock in that area.

In Quebec, Wishart and Bider found a seasonal preference for diurnal habitat: "Upon arrival in the spring, they frequented snow-free areas with warmer microclimate where earthworms would be obtained more easily. When all snow melted, use of mixed and deciduous areas was high compared to that of alder." In autumn, woodcock moved to alder woods, apparently traditional staging areas which "in dry years would supply woodcock with the food requirements for migration."<sup>57</sup>

It may be noted that woodcock breed in greatest densities in the more northern part of their range, reaching a high of 4.01 to 7.00 singing males heard per mile of random route in western Ontario, for example, as compared to 2 to 4 in Wisconsin and up to 1 in Illinois.<sup>46</sup>

With its well known preference for earthworms ("50 to 90 percent of their diet"<sup>53</sup>), it was inevitable that woodcock would suffer from DDT poisoning. Indeed, woodcock collected in New Brunswick contained so high a level of DDT that no hunting season was permitted there in 1970, and only part of the province was open in 1971.<sup>4</sup> Since the general ban on DDT, levels in woodcock have decreased.

When earthworms are scarce, woodcock feed readily on other invertebrates, including ants and grasshoppers; lacking animal food, the bird may depend on vegetable material such as fern leaves,<sup>3</sup> and especially seeds of several plant species.<sup>53</sup>

What woodcock subsist on in Manitoba in March and early April when there is a foot or more of snow on the ground is unknown. It is difficult to imagine a bird finding earthworms or anything edible at that time of year, even on the edge of open streams. It is possible that they



live off their body fat, or that they eat more plant material than is generally known. It is generally conceded that earthworms (*Lumbricus* sp.), like bluegrass, were introduced to this continent with the arrival of Europeans. (There are several species of native earthworms, but the abundant and larger *Lumbricus* species are most widely used as food by woodcock). It is also widely accepted that woodcock seek out feeding sites where earthworms are present, but there is little understanding of the relationship between woodcock breeding sites and settlements or other areas where man has been active, especially in the northern part of its range. Sheldon, in reviewing this aspect of woodcock distribution, points to a relationship between the high rate of nitrogen in litter beneath alders, a condition attractive to earthworms, and the well demonstrated prevalence of alder in woodcock habitat.<sup>51</sup>

## Conclusions

The American Woodcock is and has been for a long time a regular resident of extreme southeastern Manitoba, especially in that area south of Lake Winnipeg and east of the city of Winnipeg. Within that area alone there may be several hundred birds. Land use practices, especially the abandonment of cultivated fields and clear-cutting of timber, may mean that there are more woodcock now than prior to settlement.

How consistent the population of woodcock in extreme southeastern Manitoba is remains to be determined. Similarly, much still is unknown regarding the full extent of its breeding range west and north of Winnipeg, as well as possible fluctuations in range and numbers in that area.

More than offsetting the beneficial land use practices mentioned above is the conversion of woodcock habitat — wooded and open — to cultivated fields. This may mean a drastic reduction in numbers of woodcock. It may be necessary to take measures to preserve existing occupied habitats or to establish new habitat (and techni-

ques for doing this are available) if present populations are to be maintained.

As noted by Sheldon, the woodcock "can continue only so long as we reserve some living space for this ghostlike bird of the uplands. Endowed with fortitude and a certain nobility, the bizarre little American Woodcock excites the wonder of ornithologists and elicits the highest ethics of sportsmen. It is a natural resource of rare quality, offering recreation and aesthetic pleasure to thousands, and one we should be forever vigilant to preserve."<sup>51</sup>

Although there may be insufficient numbers of woodcock in Manitoba to warrant sport hunting, the value of the species for other use is high. The viewpoint expressed by Creighton is especially appealing: "Few people see woodcock because of its secretive nature during most of the summer and its habit of migrating at night in the fall. But there are times of the year when viewing opportunities are available and if the woodcock are concentrated, new and interesting visual and auditory experiences for people can be provided."<sup>6</sup>

## Acknowledgements

I owe a particular debt of gratitude to Herbert W. R. Copland who provided me with all the woodcock information from the numerous columns published by A. G. Lawrence. In addition, Herb was a congenial companion on many of our outings. Herb made several forays by himself in search of woodcock, including one west of Gypsumville and one with Gordon J. Smith to the Vivian Area. Robert R. Taylor kindly offered me his records, and he also accompanied me on several field trips.

I am grateful for the opportunity to publish here for the first time the valuable observation of a brood made by Eugene F. Bossenmaier. His account is an important part of this report. Numerous others have been generous in supplying data, e.g., Willard Anderson, Calvin Cuthbert,



Diann and Campbell Elliott, C. Feilberg, Rod Fowler, Gordon G. Graham, Ken de Graff, Jack L. Howard, William G. Leitch, Phil Ould, Alan W. Scarth, Dr. Spencer G. Sealy, Tim Sopuck, Harold Tirschman and Ray Tuokko. Ken Gardner kindly put me in touch with Barry K. Tully. Similarly, except for a tip from Dr. Vince Crichton, I would not have known about the interesting observations by Don W. Simkin and his companion.

Eugene F. Bossenmaier and Ralph O. Morgenweck read the manuscript and offered helpful comments. Ed Lorenz kindly prepared the maps. Robert R. Taylor, always helpful, provided the photograph of the woodcock.

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# PROBABLE LESSER BLACK-BACKED GULL AT REGINA, SASKATCHEWAN.

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My wife, Margie and I were enjoying the lovely evening of May 28, 1977, parked on the road which penetrated the flooded area south of the TransCanada Highway at the Pasqua Street exit, Regina. At 7:00 p.m. the sun was still high and the sky was clear. I looked eastward and noticed what I thought was one of the abundant Ring-billed Gulls flying towards us from the direction of Wascana Lake, about a mile away. I had a head-on view of it. Then, as it turned towards the southwest, I saw the gull's back briefly. The entire mantle was black except for white wing-tips and a white margin on the trailing edge of the wings. Its head and tail were white. It levelled off and flew on, less than 20 feet from us, showing a strong, yellow bill with a red blotch near the tip. The moment I saw the black back I exclaimed, "Look, a Lesser Black-backed Gull!" which drew Margie's attention to it in time for her to see the black back also. Unfortunately, it soon disappeared behind a farm house and we did not see it again. We had not seen the colour of the legs or the eyes or heard any call from it.

Although my first reaction was that the bird was a Lesser Black-backed Gull (*Larus fuscus*) (which we had seen some years before in England), when I checked Peterson's and Robbins' field guides in the car, the only similar bird shown was the Western Gull, so I concluded we had seen a wandering gull of that species.<sup>6 7</sup> I left on vacation the next day and because of various pressures it was some weeks before I had the opportunity of looking into the literature concerning dark-mantled gulls.

In all the world there are only five species of gulls with white heads and tails, dark mantles and yellow bills with a red blotch.<sup>1</sup> The Southern

Black-backed Gull (*Larus dominicanus*) is confined to the Southern Hemisphere. The Slaty-backed Gull (*L. schistisagus*) of northeastern Asia seldom ventures beyond the Aleutians and the Pribiloffs and, when it does, is confined to the Alaskan coast. The Great Black-backed Gull, the largest of the gulls, dwells on the coasts of the North Atlantic, drifting south in winter. Godfrey reports that it is regularly seen inland, particularly about the Great Lakes.<sup>4</sup> Jehl and Smith record it as a rare but regular summer visitor to Churchill, Manitoba, in recent years.<sup>5</sup> Also, we had seen these huge gulls, whose wingspread exceeds 5 feet, in England and there was no doubt that our bird was much too small to be this monster. The remaining two are the Western Gull and the Lesser Black-backed Gull.

The Western Gull is remarkably set in its ways. The main population, with pink legs, breeds on the coast from northern Washington south to Baja California. Its Gulf of California (Mexico) population, which has yellow legs, regularly visits the Salton Sea in southern California after the breeding season in small numbers and has been recorded off course in western Arizona.<sup>3 8</sup> A search of the records published in *American Birds* since 1971 shows that the species has been found once in Eugene, Oregon, (about 50 miles from the coast) and as such was worthy of comment. The A.O.U. Check-list lists one record at Chicago which, since this bird is not much of a gypsy, is quite remarkable.<sup>3</sup>

The Lesser Black-backed Gull breeds along the coasts of northwestern Europe, the British Isles, the Faeroes, and Iceland, (accidental in Greenland). In contrast to the Western Gull, the Lesser Black-back is



migratory. It has become established in Iceland since the turn of the century.<sup>9</sup> It was first taken in Iceland in 1913, it had begun to breed about 1928, and is now well established but continues to migrate. It has been reported regularly since 1934 in small numbers along the eastern seaboard as far south as Texas. An examination of the pages of *American Birds* discloses at least one bird observed several times at Galveston during the winter and following spring. One could reasonably conjecture that such a winter visitor could have accompanied Ring-billed Gulls northward in the spring.

Godfrey did not include the Lesser Black-backed Gull among the birds of Canada up to about 1964.<sup>4</sup> However, Alsop and Jones, reporting on a Lesser Black-back at Arctic Outpost Camp (69° X 103°) on Victoria Island, N.W.T., on July 7, 1972, noted that Godfrey had since accepted two Ontario and two Nova Scotia records as well as a sighting of this species at Fort Churchill, Manitoba, on June 5, 1968, by R. K. Ross, F. Cooke, G. Littlefield and B. Knudsen.<sup>2,5</sup> This was Canada's first record.

Obviously, the presence of a dark-mantled gull in the interior of North America, whatever the species, is a remarkable event. Regrettably, our views of the bird were too brief to get

a full set of field marks. However, it could only be the Western or the Lesser Black-backed Gull, and in view of the poorly developed migratory and wandering habits of the former when contrasted with the wide-ranging movements of the latter, I am confident that the bird we saw was a Lesser Black-backed Gull.

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Grasses in snow

J. B. Gollop



# UNNECESSARY ELECTROCUTION OF OWLS

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On July 28, 1975, I found the badly burned body of a fully grown young Great Horned Owl at the base of a power pole, four miles east and half a mile south of Wynyard. The owl had been carrying a freshly-killed snowshoe hare; evidently the hare had hung down far enough to contact the wire brace which ran from the top of the pole to the ground about 10 feet from the base. This made the contact that resulted in the electrocution of both. On July 25 the power had gone off for a few hours until the repairman came to restore it.

The owl came from a nest which I had found earlier in the spring on the same quarter section. It was in an aspen 35 feet from the ground and Dr. Houston had banded the owl and its nestmate on May 17. On the day of banding, the young were feeding on a Sora, a red-backed mouse and a snowshoe hare.

This was the second catastrophe at the same pole. On August 20, 1972, a young owl which had been the single occupant of a nest 40 feet up in a black poplar on the same quarter section was banded May 20 and met its death in exactly the same manner.

These power poles, as presently constructed, are death traps for owls. I am sure the brace could easily be lowered so that contact cannot be made simultaneously with both a live wire and the ground wire. The insulator is on the top of the pole and does not make for a good landing for owls. Large hawks and migrating eagles are also at risk.

Dr. Houston tells me that of 207 recoveries of his banded Great Horned Owls, at least 13 have been electrocuted (Can. Field-Nat., in press). In recent years, more have been electrocuted than have been reported shot, so that this is a problem of continuing importance, now that rural electrification is virtually complete.

Power corporations, both publicly and privately owned, are modifying their poles throughout much of the western United States, so that they will not readily electrocute large birds of prey. I would suggest that the Saskatchewan Power Corporation follow their good example. It would help the birds, but it would also help the power corporation, whose men often have service calls to restore power service after the "shorts" and "outages" from such accidents.

EDITOR'S NOTE: A similar situation exists in Manitoba (and presumably elsewhere) where R. W. Nero reports that Manitoba Hydro has frequently had to respond to power failures resulting from birds of prey, especially Snowy Owls, making the sort of contact described in the above article. A representative for Manitoba Hydro noted that Snowy Owls were safe when perched on top of the type of pole that presents this hazard, but that when they took flight sometimes their downward moving wings made the unfortunate contact that would complete the circuit, killing the bird and activating a circuit breaker. Field staff apparently regularly look for dead owls and other birds when investigating causes of such power failures. Gillard's plea for a change in structure of this type of power line support should receive wide application.

## SASKATCHEWAN POWER'S EXPERIENCE

FRANK SWITZER,  
Information Services,  
Sask. Power Corporation,  
2025 Victoria Ave.,  
Regina, Saskatchewan  
S4P 0S1

In reply to Mr. Gillard's article, we average approximately 100 recorded incidents of hawk and owl kills and about 100 crow and magpie kills, on power lines in Saskatchewan each year. Regional differences are obvious between the 12 superintendencies in Saskatchewan. The heavily wooded areas around Prince Albert and Nipawin average three kills of hawks and owls per year per superintendency; the parkland areas such as around Yorkton, average six



hawk and owl kills; and the southern areas record approximately twelve hawk and owl power interruptions per year per superintendency.

Two types of current use pose a problem. The one mentioned by Gillard is a running corner or farm tap structure where the ground point guy wire is attached 24 inches below the phase, not sufficient clearance for a dangling hare held in the talons of a raptor as it alights on the pole.

The other structure is the 25-kilovolt three-phase rural distribution line with lines on crossarms and a phase-to-phase clearance of 3 feet, considerably less than the wingspan

of the larger hawks and owls.

Finally, house sparrows and starlings may cause outages in substations and rural transformers, though native North American songbirds rarely do so.

When evaluating the cost, safety and security in the design of future installations and rebuilding of lines, we do consider the lost revenue and customer inconvenience of bird-induced power outages. We are considering where our designs could be modified to decrease this problem, to help both our company, our customers and the birds involved.



Great Horned Owl

Hans Dommasch



## DEVELOPMENT OF A LAND USE POLICY FOR SASKATCHEWAN

In 1976, delegates from twenty major provincial organizations met to discuss the need for a land use policy and land use policy guidelines. Delegates to the first Workshop recommended that a follow-up conference be held following detailed review and analysis of the results of Workshop I by participating organizations. A second land use Workshop was held in April, 1977.

Delegates to Workshop II were asked to submit briefs outlining the reactions of their members. The brief presented on behalf of the Saskatchewan Natural History Society by Dr. G. Ledingham appeared in the March, 1977 issue of the *Blue Jay*. Briefs were circulated to all organizations prior to the Workshop. An analysis of these briefs was presented to Workshop II delegates for discussion. Delegates reached a consensus on some guidelines for use of various types of land including agricultural land, mineral land, water heritage land, settlement lands, fish and wildlife, waste disposal land, forestry land, utility land and recreation land. Workshop delegates agreed that there should be further public involvement in the development of a land use policy.

In October, Hon. Neil Byers announced the formation of a Land Use Policy Committee with representatives from six provincial organizations (Saskatchewan Urban Municipalities Association, Saskatchewan Wildlife Federation, Environmental Advisory Council, Sask. Federation of Agriculture, Sask. Mining Association and the Sask. Association of Rural Municipalities). The Land Use Policy will undertake a land use education and information program and seek public reaction to proposed land use guidelines. The Committee will also review and advise on policy development activities initiated by government.

The Interagency Co-ordinating Committee comprised of the perma-

nent heads of 12 major departments and Crown corporations will be responsible for land use policy development activities of all government departments and agencies concerned with land use in Saskatchewan. Chairman of both committees is Grant Mitchell, Deputy Minister of the Dept. of the Environment.

Government has approved use of the guidelines, which were agreed to by delegates at Workshop II, in land use decision making until a comprehensive land use policy has been formulated and adopted by the government.

SNHS members are urged to participate in public meetings on land use which will be held throughout the province beginning early in the new year.

A copy of *Land Use Workshop II, Summary Report* which outlines the approved guidelines for various land uses can be obtained from the Department of the Environment, 1855 Victoria Avenue, Regina, Sask. S4P 3T1

## LAND USE IN SASKATCHEWAN

P. C. RUMP & KENT HARPER  
Policy, Planning & Research Branch,  
Saskatchewan Department of the Environment  
January, 1977.

The colour print on the cover of this 192 page publication by Environment Saskatchewan shows a marshy area in the foreground, scattered clumps of trees in the distance, and cropland and a farmstead in between. The potential for land use conflicts is there, but the recognition of those conflicts is dependent on the interpretation of the viewer.

The short preface explains that the "report," originally prepared for delegates to the 1976 Saskatchewan Land Use Forum, was designed to provide quick access to pertinent facts about Saskatchewan's land. If

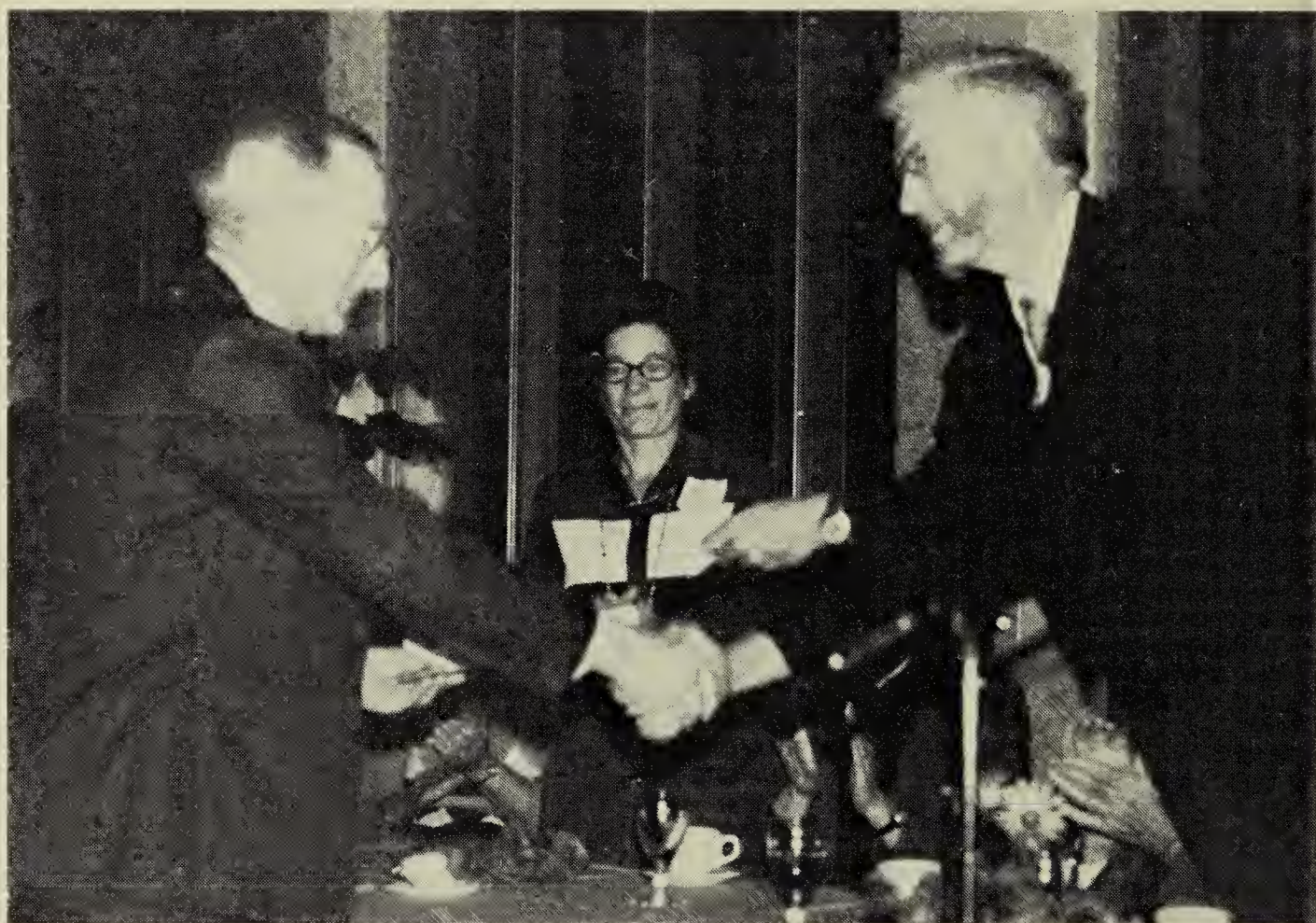


the reader turns to this source expecting a report of a study or studies on land use, or even a presentation of issues relating to the use of Saskatchewan land of information about emerging land use policy, he will be disappointed.

*Land Use in Saskatchewan* is a compilation of information from a wide variety of sources, organized into a chapter on Saskatchewan's physical, economic, and cultural geography, and its settlement history; a chapter on the resource base; a chapter on the chronology of land administration from the pre-fur trade era to the pre-

sent; and a final, long chapter entitled "Land Use" which outlines the legislative base, and the types of land use in the province, listing products, economic returns and people involved.

A comprehensive table of contents, approximately 180 tables, maps, and diagrams, and a bibliography of over 150 references make this an excellent reference tool for anyone interested in factual material about the province. — M. Evelyn Jonescu, Canadian Plains Research Centre, University of Regina.



Wayne Lynch

Dr. James R. Jowsey receiving 1977 Conservation Award from Dr. C. Stuart Houston

## 1977 AWARD WINNERS

Dr. James R. Jowsey of Regina received the Society's annual Conservation Award and Dr. C. Stuart Houston of Saskatoon received the Cliff Shaw Award at the annual meeting in October.

Dr. Jowsey's continuing service to the cause of conservation was men-

tioned, both in his professional capacity, and through his work in the Society. His most recent achievement was the authorship, with Fenton Vance and Jim McLean, of *Wildflowers Across the Prairies*.

Dr. Houston received his award for a series of historical articles in the *Blue Jay*.





Chestnut-collared Longspur nest

Fred McGuiness

## MEMORIES OF FRED BARD AND JOHN LANE

For many years now I have been interested not only in natural science but also in the *Blue Jay*. When I was executive director of the Saskatchewan Golden Jubilee I had a great deal to do with Fred Bard, for the major jubilee project was the museum in Regina. That remarkable man had his excellent specimens stuffed in vacant basements all along College Avenue, as I recall it, and providing them with a showcase was an accomplishment at least a score of years overdue. I wrote the final edition of the tribute to the pioneers which dedicates that building to their memory, and when I stopped by a year ago to see the building once again I had a host of fond recollections of meetings of the building committee.

It is of interest to me to notice the number of times you and your correspondents still mention the name of the late John Lane. I presume I might be viewed as his biographer, for I suspect that for the Brandon Sun, Reader's Digest, and CBC I wrote more about him than any other scribbler I know of. Even today I still learn new things about that man, many of them having to do with impressionable young minds which he excited with the prospects of biology

or zoology, as a career. He was a great man, and a constant reminder to many of us of how life can be enriched by pursuing as a career some form of nature.

Press on with the good work . . . . you have a host of readers and I hope I may help you find even more. Fred McGuiness, Box 1020, Brandon, Manitoba R7A 6A3.

## CORRECTION

The photograph on page 144 of the last issue of the *Blue Jay* is incorrectly identified as a Tiger Swallowtail. True Tiger Swallowtails have five "tiger" stripes, one of which is basal, on the fore wings plus a single "tiger" stripe on the hind wings. Unfortunately the photographed insect has lost the basal area of the observable hind wing. This area includes an orange spot which in the Gothic Swallowtail (*Papilio zelicaon gothica*) has a "free" central, black pupil whereas in the Cypress Hills Old World Swallowtail (*Papilio machaon dodi*) there is a black line or pupil connected to the black line on the anal margin of the wing. The illustrated insect is probably one of these two species. Dr. Charles D. Bird and James W. Case, Biology Dept., University of Calgary, Alberta T2N 1N4.



**SASKATCHEWAN NATURAL HISTORY SOCIETY**  
**Financial Statement — Year ending September 30, 1977**

<b>INCOME</b>			
Memberships (including sales of <i>Blue Jay</i> ) .	10,128.24		
Memberships (extra re: supporting and sustaining) .....	2,586.62		12,714.86
Spec. Pub. No. 1 Guide to Sask. Mammals .	12.90		
Spec. Pub. No. 2 Birds of Sask. River .....	Out of print		
Spec. Pub. No. 3 Birds of Regina .....	5.40		
Spec. Pub. No. 4 Blue Jay Index (1942-60) ..	19.80		
Spec. Pub. No. 5 Birds of Lake Athabasca ..	36.00		
Spec. Pub. No. 6 Birds of N.E. Sask. ....	24.40		
Spec. Pub. No. 7 Birds of Moose Mountain	33.00		
Spec. Pub. No. 8 Blue Jay Index (1961-69) ..	49.50		
Spec. Pub. No. 9 Birds of Rosetown-Biggar	156.85		
Publication — Hours and the Birds .....	NIL		
Publication — Birds of the Elbow .....	7.21	345.06	
Donations — General .....		295.80	
Interest (Savings account and bonds) .....		885.75	
Annual Meeting 1976 (Regina) (net) .....		56.85	
Summer Meeting 1976 (Cypress Hills) (net)		127.50	
Sales from Blue Jay Bookshop .....	14,601.05		
Less: Cost of sales .....	10,626.00		
Gross profit (27.2% of sales) .....	3,975.05		
Less: Postage, supplies, etc. ....	468.42		
Honoraria (1,390.15, 12.50) .....	1,402.65		
Net profit (14.4% of sales) .....		2,103.98	3,814.94
			16,529.80
<b>EXPENSE</b>			
Printing of <i>Blue Jay</i> (4 issues) .....	12,002.92		
Less donations for colour pages .....	1,200.00	10,802.92	
Adv. and promotion: Newsletter (2 issues) .		1,595.79	
1977 Annual Meeting CNF (Regina) .....		250.00	
Delegate's expense to meeting of Canadian Environmental Council at Ottawa .....		425.00	
Honoraria (600.00, 200.00, 100.00) .....		900.00	
Postage .....		529.56	
Office supplies and stationary .....		297.62	
Office equipment: address plates .....		115.27	
Affiliation fees .....		25.00	
Misc. office and admin. expense .....		195.18	15,136.34
EXCESS OF INCOME OVER EXPENDITURE ..			1,393.46

**Statement of Assets and Liabilities at September 30, 1977**

<b>ASSETS</b>			
Cash on hand (Bookshop) .....			40.00
Cash in bank (chequing) — SNHS .....	6,613.76		
— Bookshop .....	1,675.85		
Cash in bank (savings) — SNHS .....	9,772.19		18,061.80
Canada Savings bonds .....			5,000.00
Stock on hand (Bookshop) .....			2,360.09
Accounts receivable (595.56 less prepaid orders 18.95) ..	576.61		
Deposits with Postal Dept. (100.00, 150.00) .....			250.00
			26,288.50
<b>LIABILITIES</b>			
Trust Fund re: Sanctuaries and Conservation areas			
Balance at September 30, 1976 .....	4,152.51		
Big Gully Sanctuary: Donation in 1976-77 .....	390.00		4,542.51
Sandhill Crane migration camp			
Balance at September 30, 1975 .....			40.75
Province of Sask. — Grant for Special Publication .....			1,000.00
Individual donation for Special Publication .....	454.78		
Accounts Payable: Estimate of cost for			
Sept. 1977 Blue Jay .....			2,500.00
Owing re: Honoraria .....			1,090.15
Owing re: Education Tax .....			4.52
Suspense account .....			11.50
<b>NET WORTH</b>			
Balance at September 30, 1976 .....	15,250.83		
Plus surplus for year ending Sept. 30, 1977 .....	1,393.46		16,644.29
			26,288.50



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Patron (\$25.00) .....	<input type="checkbox"/>	<input type="checkbox"/>	.....

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